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WEIGHTS AND MEASURES IN MEDICINE.

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From The Royal Melbourne Hospital, Melbourne.

Divers weights, and divers measures, both of them are alike abomination to the LORD.

—PROVERBS XX: 10.

THE ROYAL MELBOURNE HOSPITAL adopted completely the metric system of weights and measures in medicine and pharmacy on May 1, 1958. In so doing, it became the first Australian hospital to make the complete change. The replacement of the archaic systems previously in use was made overnight, and was achieved quietly and smoothly. In fact, the first impact on the hospital and its patients was barely noticeable.

Like all other Australian hospitals, we had been using three systems of measurement before the change—the imperial, the apothecaries' and the metric—but it had been long obvious that one single system was highly desirable for efficiency, safety and economy. Gradually over the years, the systems of measurement had swung away from the imperial and apothecaries' measures to the metric system. Every new drug came to us metrically. Every scientific advance favoured metric measurement. Slowly but surely, the proportion of imperial and apothecaries' measures in our minds, our pharmacopœias and our drugs diminished.

Hospital life was once a glorious metrological muddle. Whilst we may accept that a grain is a grain, a drachm may be anything from a one-eighth part of an apothecaries' ounce (i.e., 60 grains) to a one-eighth part of a fluid ounce (i.e., 60 minims), but not a one-eighth part of an imperial ounce. The difficulty of working out percentage solutions in the imperial and/or apothecaries' systems was notorious, and further, there appeared to be no sense in such commonly accepted usage as "a sixth of a grain of morphine per cubic centimetre".

For years, every doctor and every pharmacist has used the metric system of measurement in his daily practice, and appears to experience no difficulty. All that we thought was required was for the doctor and the pharmacist to increase this usage of the metric system and to exclude other systems of measurement. In our striving to achieve unity in standards of measurement within the hospital, we became interested in the subject of weights and measures, particularly from an historical point of view, and could not help but admire the many people who have striven to achieve uniformity out of diversity. Nor could we remain altogether unsympathetic towards the staunch defenders of the imperial system, who, steeped in the tradition of and loyalty to the Empire, felt that "the English speaking communities lead the world in commerce, with a common system of weights and measures" (J. W. Evans). Scientific advances in medicine and pharmacy, however, have provided a little more justification for the use of the metric system than was ascribed to scientists using the

metric system at the beginning of this century: "Some (scientists), it is true, simply follow in the footsteps of others; some, merely to give a tone of science to their books." (J. W. Evans.)

A brief historical account will show the origin of the complexities of the imperial and apothecaries' systems of weights and measures, as contrasted with the simplicity of the metric system.

Ancient Weights and Measures.

From time immemorial, weights and measures have been the lifeblood of trade. The earliest weights discovered were made of limestone (Egypt, about 7000 B.C.); this, although easy to cut to standard size, was not durable. Later weights were fashioned of hard stone, bronze, silver and gold.

The beqa standard of weights was used in Egypt for thousands of years. It is believed to have survived in some of the Greek standards about 700 B.C., in one of the Roman pounds, and in the Arabic system about the seventh century A.D. Some believe that the beqa is the basis of one of the English troy weights.

Weights and measures were based on natural units like the length of a foot, the breadth of a hand or finger, the length of an arm, the span of the hand, or the weight of a grain of wheat or barley, and the weight of a sack of wool.

Weights were used in trade, and coins were often used as weights. Countries frequently changed their standards of weights and measures to meet the trade requirements of other countries. The Greeks had drachms and scruples as units of certain sizes, and the Romans used *libra* or pounds, which they divided duodecimally into *unciæ* or ounces and various sub-multiples. The Romans had a delightful habit of preserving local systems of coinage and weight in all conquered territories, merely superimposing Roman names and markings upon local standards without bothering to find out what they actually weighed. The result was seven or eight coexistent varieties of the "Roman" pound, all differing from each other in weight, but quite indistinguishable by their markings. The Arabs, from the fifth century A.D. onwards, used coins and weights which were readily divisible into Greek, Persian and Egyptian standard units for trading purposes. Arab standard weights are said to have been sent by Harun al-Rashid to Charlemagne.

British Weights.

The history of the development of the British system of weights and measures is tortuous, but nevertheless facets of history are mirrored in the confusing story. No one knows exactly how or where British weights and measures originated. The lack of knowledge is more than compensated by the number of conjectures. Some say that they must come from Roman coins and weights (after all they are pounds and ounces); others trace the origin back to Greek or even Egyptian systems; and quite a number of opinions favour a more directly Arabic origin.

From A.D. 757 to 769, Saxon weights were in use. King Offa instituted a new coinage, the silver penny of 22·5 grains. The silver penny was known as the easterling, from its presumed eastern or Arabic origin, and hence the penny sterling.

Twenty penny weights of 22·5 grains were one ounce, and 12 ounces were a moneyer's pound (later known as the tower pound), which therefore consisted of 5400 grains. The weight of the penny sterling varied slightly from time to time, but returned to the 22·5 grain standard by the time of Edward the Confessor. The weight and nature of the commercial pound, if any, used during the Saxon period is not known.

In 1215, Magna Charta confirmed and duly certified the weights and measures then in existence without troubling to describe them in any way.

In 1266, Henry III defined the (moneyer's) tower pound system of weights for both coinage and commercial use as follows:

> The English penny which is called a sterlyng, round and uncut, ought to weigh 32 grains of wheat taken from the middle of the ear. And the ounce ought to weigh twenty pennies. And 12 ounces make the London pound, that is to say 20 shillings sterlyng . . . And let it be known that the pound of pennies and of spices and confections as well as of apothecaries goods, consists of 20 shillings; the true pound of all other things is 25 shillings. The true ounce consists of 20 pennies and the pound contains 12 ounces. In all other things the pound contains 15 ounces. The true ounce here also is 20 pennies in weight.

In 1340, Edward III defined the avoirdupois pound and prepared avoirdupois standards, probably for use in the Mediterranean trade. The avoirdupois weights of Edward III were a pound of 6992 grains with an ounce of 437 grains. The word avoirdupois originally referred to the weight of bulky goods which were comparatively heavy in relation to their value—e.g., wool. Gradually the avoirdupois system of weights emerged as a standard quite separate from the standard for coin and bullion. Three distinct pounds were standards at that time: (i) Henry III, London pound, 5400 grains, 12 ounces; (ii) Henry III, merchant pound, 6750 grains, 15 ounces; (iii) Edward III, avoirdupois pound, 6992 grains, 12 ounces.

In 1414, a statute of Henry V mentions "pounds of Troy" in describing the work of English goldsmiths, probably for the first time, although from the obvious way pounds of troy are mentioned it would seem that they may have been in current use for some time.

The troy system is as follows:

24 grains = 1 pennyweight (dwt.).
20 dwt. = 1 ounce (oz.).
12 oz. = 1 pound troy (*Pd.* or *lb. Tr.*).
15 troy ounces (each 480 grains) = 16 tower ounces (each 450 grains).

Theoretically, and for reasons unknown, the troy grains were barley grains and not wheat grains as in the tower pound. Practically, both troy grains and tower grains were identical, metal grain weights having replaced the vegetable begetters of the standards.

In 1527, the standard troy pound of 5760 grains became the official standard mint pound; at the same time the tower pound and the merchant's pound were abolished.

In 1588, Elizabeth I had standards made for the troy pound and the avoirdupois pound. One avoirdupois pound equalled 16 ounces or 7000 grains. Another merchant's pound crept in about this time, but did not last long.

In 1824, new British standards were made and legalized, and became known henceforth as imperial standards. The troy pound of 5760 troy grains became the legal standard, and the avoirdupois pound was defined in terms of the troy pound (7000 grains).

In 1855, after destruction of the standards by fire, new imperial standards were legalized, and the avoirdupois pound of 7000 grains became the fundamental legal standard. The ounce equalled one sixteenth part of the imperial pound; the grain equalled one seven-thousandth part of the imperial pound.

In 1878, the *Weights and Measures Act* was passed. This is the basis of modern British metrology. The troy pound was abolished, although the use of other units of the troy system was permitted under specified conditions:

> All goods sold by weight shall be sold by avoirdupois weight except gold, silver, platina, diamonds and other precious stones which may be sold by troy weight: and drugs which when sold by retail may be sold by Apothecaries' weight.

In 1879, an Order in Council defined the unit of weight and of capacity in the Apothecaries' System, as follows:

Weight: 20 grains = 1 scruple.
3 scruples = 1 drachm.
8 drachms = 1 ounce (480 grains).

Capacity: 1 fluid ounce = 437·5 grains of water.
= 1/160 Imperial gallon.
1 fluid drachm = 1/8 fluid ounce.
1 minim = 1/60 fluid drachm.

British Measures of Capacity.

In 1497, Henry VII based the old Winchester gallon on the average volume of 100 troy ounces of wheat at threshing dryness.

In 1702, William III redefined the Winchester gallon as a volumetric measurement of 268·8 cubic inches.

In 1707, the Queen Anne wine gallon was defined as a liquid gallon of 231 cubic inches.

In 1824, the *Weights and Measures Act* defined the imperial gallon as follows:

> Standard Measure of Capacity, as well as for Liquids as for dry Goods . . . containing Ten Pounds Avoirdupois Weight of distilled Water weighed in Air, at the Temperature of Sixty-two Degrees Fahrenheit's Thermometer, the Barometer being at Thirty Inches.

The imperial gallon, thus defined as the basic unit of capacity, was found to contain 277·274 cubic inches.

In 1932, the correct capacity of the imperial gallon was found to be 277·421 cubic inches. The imperial gallon was intended to relate weight and capacity directly, as follows: one gallon equals 160 fluid ounces, 160 fluid ounces having a water weight of 160 avoirdupois ounces.

Weights and Measures in the United States of America.

In the U.S.A., the units of weight and measure are practically the same as those used in the colonies before the U.S.A. were established. Thus, in 1836, the U.S.A. adopted the Winchester gallon as their dry gallon, a bushel of eight such dry gallons being their standard (2150·42 cubic inches). They also adopted the Queen Anne wine gallon as their liquid gallon.

Legislation on weights and measures is in the hands of individual States, and thus, although the same system is in general use throughout the U.S.A., there are differences in individual States.

Since 1893, the yard has been defined in terms of the international prototype metre, because it was found that what was previously believed to be an exact copy of the imperial yard actually differed from it considerably. The standard of mass is defined in terms of the international standard kilogram. Thus, although U.S.A. standards of length and mass resemble the imperial units, they are independent of them and not identical with them.

The U.S.A. gallon is the fundamental unit of capacity. The U.S.A. gallon is 231·00 cubic inches. Properly expressed in the metric system, it is 3·7853 litres.

The U.S.A. minim is about 4% larger than the British imperial minim.

The U.S.A. fluid "dram" of 60 minims differs in volume from the volume of one avoirdupois "dram" of water, and from the volume of one apothecaries' "dram" of water by weight.

The Metric System.

Although a universal system of measurement had been suggested by enlightened people in the seventeenth century, nothing definite was done until the advent of the French Revolution in 1789. Perhaps the prevailing spirit of restlessness and innovation inspired what was believed to be a universal, scientific and logical system of weights and measures.

The French Academy appointed several committees with representation from other countries to perform the tremendous task with which it had been entrusted. Meridianal measurements were undertaken, and the metre was defined as the ten-millionth part of the computed length of the meridianal quadrant—i.e., the distance from the pole to the equator. The metre (from the Greek μέτρον, a measure), with its decimal multiples and submultiples, was intended to serve not only as a standard of length, but also as a standard of weight derived from the weight of a cubic metre of water or some decimal part of this under specified conditions.

This new system of related weights and measures became the metric system, which was officially adopted in France in 1795. Details were worked out in cooperation with other countries, and the standard metre and the standard kilogram were formally presented to the French Assembly in 1799.

The initial establishment of the metric system was slow, because people instinctively adhered to former measures. In France, after interim compromises, all weights and measures other than in the metric system were declared illegal in 1840.

At the Metric Convention in Paris in 1875, 18 countries agreed to establish an International Bureau of Weights and Measures at Paris, and to accept the French Archives Metre of 1799 as the new standard international metre, and the standard kilogram of 1799 as the new international standard kilogram.

The original standards, with duplicates, were kept in the vaults of the Pavillon de Breteuil in the outskirts of Paris.

In 1889, new prototype standards were made of a 90% platinum 10% iridium alloy, which had proved most reliable and durable. Prototype standard metres and kilograms were prepared and issued to many countries. Standard centigrade thermometers were also prepared and distributed.

Great Britain joined the Metric Convention in 1884, and legalized the optional use of weights and measures in the metric system in 1897.

Weights and measures of the U.S.A. have been defined in terms of the international prototype metre and of the international kilogram since 1893.

The metric system is used internationally in science, and practically throughout Europe and parts of America and Asia.

The permanent International Bureau of Weights and Measures is under the supervision of the International Committee of Weights and Measures, which is controlled by the representatives of all contracting governments; it meets at least once every six years.

The metre is the primary standard of length, and is defined as the distance between two lines at 0° C. on the platinum-iridium bar known as the International Prototype Metre of the International Metric Convention deposited in the International Bureau of Weights and Measures.

The kilogram is defined as the primary standard of mass of the Prototype Kilogram of the International Metric Convention deposited in the International Bureau of Weights and Measures.

The litre is defined as the volume of one kilogram of air-free water at its maximum density. The litre is 1·000027 cubic decimetres. The litre is the internationally accepted measure of fluid volume in the measurement of all volumes not of simple geometrical form.

The centigrade scale of temperature is defined as a scale having as fixed points the freezing point of water saturated with air (0° C.) and the boiling point of water at a pressure of 760 mm. of mercury (100° C.).

The nomenclature of decimal multiples and submultiples is such that prefixes derived from the Greek (deca-, hecto-, kilo-) denote multiplication by 10, 100, 1000; and that prefixes derived from Latin (deci-, centi-, milli-) denote division by 10, 100, 1000.

The Metric System in Great Britain.

Britain had joined the Metric Convention in 1884, and legalized the optional use of weights in the metric system in 1897. This is when the controversy began: should the metric system be adopted completely, to the exclusion of the imperial system?.

For a long time the field was swayed by the staunch defenders of the imperial system; whole books were devoted to the subject.

Evans considered the imperial system vastly superior to the metric system, and cited various eminent authorities in support of his views:

> But when the extent and the diversity of English commerce is borne in mind, it is a fact worthy of notice that the natural English system is a single system, having one foot, one mile, one acre, one pound, one gallon, and one bushel . . . The pre-eminence it has is due to the fact that it is not a scientific system, but purely adapted to convenience in commerce. (H. J. Chisholm, late Warden of Standards, quoted by Evans.)
>
> The British system is immeasurably superior in every respect. Any calculation which can be made in the French metric system, we can make with equal ease by the British system, and hundreds of calculations can be made much more easily by the British system than by the metric system itself. (C. F. Howard, quoted by Evans.)
>
> Take the sixteenth . . . a child knows that an ounce is the sixteenth part of a pound, but it takes a highly trained intellect to realize that ·0625 is the decimal of it. (C. F. Howard, quoted by Evans.)
>
> We have the best system of weights and measures in existence. (Evans.)

Evans's opposition to the metric system was no less vehemently supported by the authorities he cites:

> Suppose the metric system be adopted. Obviously at once confusion would arise in every counting house, every shop, every place concerned in trade. (Evans.)
>
> The claim to scientific accuracy of the metric system is absurd. The base is incorrect; the standards formed upon it are faulty for aught we know, for they have not been subject to examination since they were enshrined and secluded strictly from the public gaze. (Evans.)
>
> Notwithstanding all the fuss that has been made over this system as a scientific system, which all the world should follow, the fact of the matter is that it is thoroughly unscientific, unmathematical in its basis; and its unit, the metre, or measure, except for its being (assumed) 1/10000000th part of the quarter circumference of the earth, is a measure of nothing. (Thomas Rankin, in an essay "Measure for Measure", quoted by Evans.)
>
> I do not think you could easily drive into the common mind, in England, the idea of ascending by Greek words and descending by Latin words. The distinction between the decimetre and the decametre, the millimetre and chilliametre, would be scarcely recognized . . . The nomenclature would be found exceedingly inconvenient and unintelligible . . . almost unconquerable difficulty, in introducing into this country the uncouth terms of the French metrical system . . . not in the spirit of the language. (Professor A. De Morgan, quoted by Evans.)

Altogether more than half a century passed after the optional use of the metric system had been legalized in Great Britain, before its complete adoption was seriously recommended. In 1951, the "Report of the Commission on Weights and Measures Legislation" recommended that "the Government should take steps, in the concert with the Commonwealth and the U.S.A., to abolish the imperial system of measurements in favour of the complete adoption of the metric system over a period of about twenty years". And there the matter rests.

The same report also recommended that weights and measures in medicine and pharmacy should be entirely in the metric system. This challenge was taken up by the Association of British Pharmaceutical Industry, supported by the Pharmaceutical Society and the Guild of Public Pharmacists, who, in 1953, implemented the decision that "solids, liquid galenicals, and pharmaceutical chemicals should be sold in metric weights and measures (the liquids by volume)".

Weights and Measures in the "British Pharmacopœia".

The *Medical Act* of 1858 states:

> That the General Council shall cause to be published under their direction a Book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed . . . to be called "British Pharmacopœia".

The attitude of those who prepared the "British Pharmacopœia" towards systems of weights and measures has been wholly admirable throughout. First, they strove to sort order out of the confusion arising out of the concurrent use of the apothecaries' and the imperial systems; and secondly, they sought to introduce the metric system into medicine as early as practicable.

The 1885 edition states:

> No alteration has been made in the weights and measures which in the edition of 1864 were directed to be used in the preparation of medicines. The grain weight, established by law in this country, is well known and well defined. It has been in use from a very remote period, and forms a convenient unit for estimating the weight of many medicines. The avoirdupois ounce and pound, being the weights practically used in the sale of medicines and generally in commercial transactions, were adopted in the edition of 1864, and are still retained in preference to troy weights of the same denomination . . . It is strongly urged upon all medical men to avoid the use of the terms ounce and pound with reference to any other than the avoirdupois or Imperial Standard weight . . .
>
> The Council are not insensible to the advantages that would result from the adoption of one uniform system of weights and measures, to be used alike for all substances and in all countries, and they observe with satisfaction the efforts which have been made for the realisation of this object; but considering the paramount importance of avoiding errors in preparing and dispensing medicines, they cannot recommend that, in such operations, a system should be adopted which has been as yet but little used, and is to a great extent unknown in this country; and on this account they have not employed the metrical system, even as an alternative, excepting in the processes for volumetric estimations, which are now so arranged that the same solutions may be made and used either with British weights and measures or with those of the metrical system.

The 1898 edition states:

> The alternative employment, in the British Pharmacopœias of 1867 and 1885, of metric weights and measures in the paragraphs relating to volumetric analysis, is now extended to every official paragraph which makes reference to the usual Imperial weights and measures; but the metric system alone is employed in all paragraphs relating to analysis, whether gravimetric or volumetric . . .
>
> During the period of transition from the Imperial to the metric system a certain amount of confusion is likely to occur. It has been somewhat difficult, in the course of a single paragraph, to embody formulæ involving definite quantities of materials, and to give precise directions for their employment, in two different systems of weights and measures; and those who use the Pharmacopœia are requested to avoid the assumption that Imperial and Metric quantities thus placed in juxtaposition are necessarily equivalent to one another . . . Except for wholly insignificant fractional differences, a preparation made according to either system will contain the same proportions of ingredients; but, as a matter of course, the two systems cannot both be used in the same operation.

The 1914 edition states:

> In this Pharmacopœia the Centigrade thermometric scale, and the metric system of Weights and Measures, are used for all pharmaceutical and analytical computations. The metric system has also been employed for the specification of doses, in the expectation that in the near future the system will be generally adopted by British prescribers. At the present time students and practitioners of medicine are accustomed to use the metric system in connection with the work of chemical, physical, physiological, pathological and pharmacological laboratories; it will doubtless facilitate the application of science to practice when the same system is used for therapeutic purposes also.

Further progress was made in the 1953 edition, in which "Doses are expressed in the metric system only, except for those substances and preparations commonly used or prescribed in the Imperial System".

This trend continued in the 1958 edition, in which the dose of 125 drugs is expressed in the metric system only.

Discussion.

It must be conceded that the metric system is not the perfect system of weights and measures; but after

over eighty years of usage in many countries, it would appear to be the most suitable system to meet the terms and conditions of medical and pharmaceutical practice.

Its main advantages are its international recognition, its universal use in the field of science and scientific achievement; the interchangeability and the interrelationship of its weights, measures and fluid volumes, and the ease of decimal calculation.

The disadvantages of the adoption of the metric system have been quickly grasped by the opponents of change. There is certainly the possibility of error due to misreading or misplacement of the decimal point. Such a possibility in our opinion is no greater than the possible misreading of apothecaries' signs—namely, ʒ and ℥—and further, the difficulty can be easily overcome by using a decimal line instead of a decimal point—for example:

G. or ml. 1 | 25

The second disadvantage is the cost of replacing existing measures and weights with metric standards. Such weights and measures usually have a limited life, and require replacement from time to time. If the spirit is willing, the initial cost factor is negligible compared with the advantages which accrue and with the undoubted savings which ensue.

Australian Standards of Weights and Measures.

Throughout Australia, there is no common policy regarding standards of weights and measures, and it is obvious to us that State authorities are looking to the Commonwealth Government for guidance and leadership in this matter.

Each State has its own separate *Weights and Measures Act*, and although similarities exist in many respects in the various States, there is not one common pattern. All States specify the apothecaries' systems of weights and measures. In one State, the "British Pharmacopœia" is not, at present, officially recognized. In four States, the use of the metric system is not permitted, and in one of these four States there appears to be strong opposition to the metric system, in that the use of this system for trade, which includes dispensing, is not permitted for any purpose whatever, pharmaceutical or otherwise. Several of the States would appear to be reluctant to sponsor any change in the present system.

The Commonwealth Parliament brought down the *Weights and Measures (National Standards) Act* in 1948; but because of difficulties that have been encountered during the course of framing regulations to give effect to the provisions of the Act, no action has yet been taken to bring the Act into force. It is hoped that these difficulties will be overcome in the near future, and that regulations will be brought down to define the various units and standards. When this is done, we understand that the units and standards of measurement defined under Commonwealth regulations will become the sole legal units and standards for Australia, superseding the units and standards of measurement at present prescribed by State legislation. It is expected that the Commonwealth regulations will provide for the use of the metric system as well as of the imperial and apothecaries' systems.

Introduction of the Metric System into Hospitals.

In introducing the metric system completely into any hospital, there are few difficulties, provided that the introduction is planned definitely and the cooperation of all members of the staff is sought. Explanation rather than direction will secure a more cooperative response. It is recognized that each hospital and, indeed, each section of a hospital will have its own particular difficulties. However, we could express the method we used in the form of a simple prescription:

Take an enthusiastic and cooperative medical staff, who have foreseen the introduction of such a system and have had the hospital pharmacopœia printed in the metric system.

Tutor the resident medical and nursing staff q.s.

Print new medical labels, temperature and fluid balance charts.

Add a metric conversion table.

Buy medicine glasses,[1] measuring vessels, centigrade thermometers, and a few "yardsticks" by the metre.

Adjust scales to measure metrically.

Mix gently in the pharmacy.

Pour into prepared vessels.

Swallow draught overnight.

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SALMONELLÆ IN DESICCATED COCONUT, EGG PULP, FERTILIZER, MEAT-MEAL AND MESENTERIC GLANDS: PRELIMINARY REPORT.

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IN spite of the steady decline of *Salmonella typhi* infection in latter years, the incidence of infection by salmonellæ in general is increasing in man (Seeliger, 1956; Norcross, Read and Litzky, 1958). An endeavour has been made to investigate the occurrence of salmonellæ in some vehicles which could be agents in the spread of these organisms including new serotypes unknown till now in our community.

Salmonellæ can be directly transmitted to man by the ingestion of contaminated food and, indirectly, by *Salmonella*-contaminated fodder consumed by animals. One should assume that all salmonellæ can be found in the animal world, as even *S. typhi* and *S. paratyphi A*, which are generally accepted as being connected with human carriers only, have been isolated from animals.

The following scheme should represent the path of infection in the material investigated by us: (1) Coconut

[1] The medicine glasses used at The Royal Melbourne Hospital for the introduction of the metric system were donated by Sandoz, Switzerland.

→ food (confectionery) → man. (ii) Egg products, especially egg pulp → food → man. (iii) Animal fodder or organic fertilizer → animal → man → sewage → birds, rodents, fodder, etc., thus renewing the cycle.

Desiccated Coconut.

Thirty-five samples of coconut imported from Ceylon have recently been examined, and in nine samples salmonellæ were found. Eight samples were contaminated with a solitary serotype: from one sample, *S. paratyphi B* was cultured; from two samples, *Salmonella* strains with a new *Salmonella* serotype, *S. perth*, were cultured and from five samples, *S. butantan* was isolated. One sample only was contaminated with two *Salmonella* serotypes, *S. edinburgh* and *S. perth*.[1]

The occurrence of *Salmonella* in desiccated coconut could be of great public health importance, although only a few instances of *Salmonella* infections were connected with it. Attention should be drawn to the outbreak of typhoid in 1953 in eastern Australia, which was almost certainly associated with infected coconut (Wilson and MacKenzie, 1955). Bacteriological investigations undertaken on coconut in Western Australia in 1953 because reports from the Eastern States disclosed 37 contaminated specimens from Papua, seven of which contained *S. nyborg* and 30 *S. senftenberg*.

The minimum infective dose for man by ingestion of many of the salmonellæ is in the region of hundreds of thousands to several million bacteria, differing according to their types. For this reason we do not usually realize the importance of desiccated coconut as a vehicle for *Salmonella* infections. The main danger lies in the possibility that other foodstuffs, which may serve as good media for the multiplication of pathogens, will be contaminated by salmonellæ in the coconut. This contamination may occur directly or by hand or by kitchen equipment. Concerning the infectivity of salmonellæ, it should be noted that *S. typhi* behaves differently from other salmonellæ, and a single bacterium may be sufficient to cause an infection in man (Kehr and Butterfield, 1943).

Our isolation of *S. paratyphi B* should serve as a warning, so much more so as one isolation has already been reported by Wilson and MacKenzie, and should indicate the need for control and for the disinfection of all foodstuff which is produced under primitive hygienic conditions. There has been no noticeable increase in enteric fevers in Western Australia, in spite of the salmonellæ revealed by our findings. However, as *S. paratyphi B* may cause gastro-enteritis only, bacteriological examinations would frequently not have been requested, and thus the cases would have escaped notification.

We started wide-scale experiments on the elimination of the pathogens in coconut (which cannot be pasteurized) and obtained good results with ethylene oxide, although the radiation preservation of foodstuffs should be borne in mind. Either gamma rays from spent fuel rods from nuclear reactors or cobalt 60, or electron sources from resonant transformers, linear accelerators or Van de Graaf generators may serve this purpose.

Egg Pulp.

Birds are probably the greatest reservoir of salmonellæ, and the contamination of eggs by salmonellæ is known all over the world. Hens may be carriers of salmonellosis and may lay eggs containing salmonellæ. *S. typhimurium* was found in infertile eggs in Victoria, and thus it is apparent that it can be passed by a carrier bird to its eggs (Seddon, 1953). But more often the contamination is derived by bacteria present in bird fæces penetrating the egg-shell.

As eggs are used for human consumption mostly in a partially cooked state (egg custard pudding, trifle, meringue) and sometimes in a raw state (mayonnaise, artificial cream, etc.), salmonellæ in them are frequently ingested. Even the boiling of eggs for four minutes does not always destroy salmonellæ, in the same way as the cooking of meat does not always provide complete protection, as the penetration of heat into meat is slow and the interior often may not reach sterilization temperature. This is especially the case in meat pies and roast fowl. The ingestion of salmonellæ can be dangerous, especially for children, who are more susceptible than adults.

Of 631 egg pulp specimens examined, 217 (34·4%) showed the presence of *Salmonella* bacteria. A high percentage of the infected egg pulps contained *S. pullorum*, i.e. 17·1% of the samples submitted. Fourteen of these specimens infected with *S. pullorum* were further contaminated with a second type of *Salmonella*. *S. pullorum* is generally considered non-pathogenic to man, although there have been several outbreaks of food poisoning connected with it (Mitchell, Garlock and Broh-Kahn, 1946). These results are most important, as it has been generally accepted in agricultural circles that *S. Pullorum* had little or no significance in Western Australia.

In addition to the high degree of contamination by *S. pullorum* of the egg pulp examined, *S. typhimurium* (9%) and *S. oranienberg* (4·1%) played an important part in our material. Further, *S. derby*, *S. potsdam*, *S. muenchen*, *S. newport*, *S. anatum*, *S. nyborg*, *S. meleagridis*, *S. give*, *S. orion*, *S. senftenberg*, *S. worthington* and *S. adelaide*, as well as some serotypes whose classification is not yet completed, were found in the egg pulps. Eight double infections were found with salmonellæ other than *S. pullorum*.

Fertilizer, Blood and Bone.

We could find no Australian literature on the occurrence of salmonellæ in blood and bone, meat-meal, fish fertilizer and bone dust, but there are important references from overseas by Mueller (1952, 1954), Rasch (1955), Bischoff (1955), Rohde (1955), Richter (1956), Walker (1957), Zureck (1957), Rowan (1957) and Bernstein (1958). It is of interest that the only literature available to us on salmonellæ in fertilizers of animal origin in Australia originated from Mueller in Copenhagen, who found that of nine imported bone samples from Australia ("knuckle and toe bones" and crushed bones) five samples contained salmonellæ. The following serotypes were identified: *S. typhi murium*, *S. bredeney*, *S. derby*, *S. san diego*, *S. waycross* and *S. adelaide*.

We commenced, therefore, the examination of the various fertilizers of animal origin and animal fodder such as meat-meal from the different Australian States. From the results of these examinations, it was evident that a high percentage of the samples obtained contained *Salmonella* species. Our material to date has consisted of 88 specimens, and in 43 of these *Salmonella* bacteria were found, corresponding to 48·9% of the specimens, and so far 24 serotypes have been confirmed. As most of the specimens which gave positive findings contained several serotypes of *Salmonella*, and from one single sample at least 13 *Salmonella* serotypes were isolated, one may state that Australian fertilizers and meat-meal are heavily contaminated with salmonellæ. The serotypes found so far are *S. bredeney*, *S. derby*, *S. san diego*, *S. typhimurium*, *S. oranienberg*, *S. bareilly*, *S. bovis morbificans*, *S. kentucky*, *S. newport*, *S. saarbruecken*, *S. amager* or *S. orion*, *S. anatum*, *S. lexington*, *S. meleagridis*, *S. nyborg*, probably *S. westhampton*, *S. cambridge*, *S. new brunswick*, *S. selandia*, *S. senftenberg*, *S. taksony*, *S. cubana*, *S. worthington*, *S. adelaide*. The classification of some of the remaining serotypes has not yet been finalized.

Similar results were found in the fertilizers imported from New Zealand. From the four samples examined, three contained salmonellæ; *S. nyborg*, *S. new brunswick* and *S. selandia* were isolated.

These results should draw attention to the possibility of the spread of salmonellæ through fodder to domestic animals—chickens, pigs, cattle, etc. The use of *Salmonella*-infected organic fertilizers is just as great a potential risk as the foodstuff itself, and infected animals or even vegetables may cause indirectly an infection in man or

[1] The serotyping of this new *Salmonella* was done by Dr. Nancy Atkinson, Salmonella Reference Laboratory, Adelaide.

produce a latent carrier state of infectivity which could be particularly dangerous among food handlers.

From our current investigations on *Salmonella* bacteria in mesenteric glands—from which these bacteria may be temporarily excreted with the fæces—it can already be said that the results confirm a heavy *Salmonella* infestation in pigs and cattle. Of the 200 glands examined, 31·5% contained salmonellæ. From the glands the following 15 *Salmonella* serotypes have so far been isolated: *S. derby, S. typhimurium, S. choleræ-suis, S. oranienberg, S. bovismorbificans, S. newport, S. give, S. meleagridis, S. cambridge, S. adelaide* and, probably *S. birkenhead, S. muenchen, S. london, S. vejle* and *S. newington*. A number of the glands were infected with several serotypes, and some of them contained as many as five serotypes. The spread of salmonellosis in pigs (Medical Research Council, 1947) and in chicken stock (Gordon and Buxton, 1946) in England, through waste from imported dried egg powder from U.S.A. being fed to them with other kitchen refuse, is a classical example, and the infected fodder in Australia represents a comparable danger. It is obvious that under suitable conditions these circumstances can lead to the significant occurrences of food poisoning in man.

Heat treatment of fertilizers and fodder of the meat-meal type will destroy salmonellæ, and it should be essential for all these products to be bacteriologically controlled. The contamination may be partly due to the improper hygienic conditions in the factories which produce these meals and fertilizers, as many of these products undergo heat treatment which should kill the *Salmonella* bacteria. A recontamination of the processed product is very probable, but the possibility of contamination by rodents during storage and transport should also be kept in mind. A regulation concerning heat treatment of the finished products—steam at 100° C. or autoclave at 115° C. or dry heat sterilization at 140° C. for an adequate period—would be essential.

A detailed report with the methods used on over 5000 *Salmonella* strains isolated in the above-mentioned investigations will be published elsewhere.

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Addendum.

While this paper was in the press, Gray, Lewis and Gorrie (1958) published a paper on "Bonemeal as a Source of Bovine Salmonellosis", *Aust. vet. J.*, 34: 345, and reported the occurrence of 12 *Salmonella* serotypes in their material.

MELBOURNE UNIVERSITY CHILD GROWTH STUDY.

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> The magnitude of a disease is in proportion to its deviation from the healthy state, and the extent of the deviation can be ascertained only by him who is perfectly acquainted with the healthy state.—GALEN (A.D. 131-201), *Methodus Medendi.*

ADULTS represent the end product of a long series of interrelated changes that have taken place during growth. In addition to the variations seen among adults, there are also striking variations in the pathways individual children travel in reaching maturity. These variations can be appreciated only when regular assessments are made of the same children. Information relating to them is of great importance to those dealing with the health and welfare of children, because the accurate diagnosis and assessment of pathological conditions often depend on a clear understanding of the normal range of variation in growth patterns.

The aim of the Melbourne University Child Growth Study is to establish the limits of normal variation of growth and development for Australian children, so that the pathologist, radiologist, clinician, orthodontist, psychologist and social worker can recognize deviations from normal, and in this way detect growth aberrations earlier and assess them more accurately. The study is a longitudinal one, in which individual children are examined at regular intervals, attention being directed to changes over a long period of time rather than to the status at a single examination. Only in this way, and with the cooperation of different sciences, can the dynamics of growth processes be appreciated.

A study of Australian children is justified for the following reasons.

1. Overseas projects vary in the racial origin of the children studied and in the age range over which they extend, while, in most of them, there has been little emphasis on structural changes during growth. Throughout this study, an attempt is being made to elucidate more completely those aspects of physical growth which have received little attention from other workers. It is considered that the most promising fields for the investigation of unrecognized or poorly understood growth changes are conventional and cephalometric radiography.

2. It is not known whether Australian children follow the same patterns as those recorded for the children of other countries. Local pædiatricians, orthodontists and dentists frequently request assistance in the evaluation of their patients. This leads to stimulating discussion and a consequent improvement in both research and

practice. In addition, it produces an awareness that normal standards for the changing proportions of the body, the maturation of bones, the eruption times of teeth and dietary habits during childhood are needed for the accurate clinical evaluation of local children.

3. Pædiatricians assessing short children need to determine whether they are skeletaly retarded and will grow slowly but normally. It is impossible to make such an assessment unless standards of skeletal maturity have been determined for normal local children.

A Child Growth Study Unit was established in the Anatomy Department, University of Melbourne, in September, 1954, to cover the objectives outlined above. Since then the physical growth of three groups has been studied: (*a*) 120 normal children; (*b*) 158 mongoloid children; (*c*) 20 children with "dwarfism". The nature of these investigations will be described under several headings.

Normal Children of Australian Parents.

The 60 boys and 60 girls forming this group were approximately two years of age when the first examinations were made in September, 1954. With very few exceptions the children are second generation Australians of British stock, and are representative of the Melbourne community in regard to geographic, social and economic influences. All are still associated with the study, except for one boy who died and four children whose mothers are no longer cooperative. Each child attended at three-monthly intervals between the ages of two years and four years, and until the age of six years will be attending at six-monthly intervals, after which the visits will become annual. During these visits the children are examined by an anatomist-anthropologist, a pædiatrician, a dentist, an orthodontist, a dietician and a child psychologist. Although the examinations by these workers will be described separately, it is stressed that no such division is present in the study, since each aspect is intimately related to and ultimately dependent upon the others, and each contributes to an increase in our understanding of individual children.

History.

A complete family and individual history is taken which records medical, dental, genetic, economic, social, dietetic and psychological factors.

Clinical Examination.

Clinical examination determines the nature of any deviations from normal in general health, posture and nutritional status. None of these children has been the victim of any serious disease, but all have suffered from minor ailments. However, these are not sufficient to exclude a child from the "normal" group, for by the term "normal" we do not mean a child who has escaped all diseases, but one whose illness is not so great that it interferes permanently with function. The medical records contain some information on the incidence of minor ailments in these children in relation to their housing. The survey was not designed to investigate these features, but the findings regarding such matters are more than incidental.

Dental Examination.

The dental examination relates to the time and sequence of both eruption and loss of the teeth, to their presence, size and shape, to the occurrence of enamel hypoplasia, to the state of the dento-alveolar tissues and to the function of the facial musculature. Carious lesions are being graded according to the scheme used by Mellanby and Coulmoulos (1946).

Because the extraction of any deciduous tooth is followed by local growth disturbances, frequently leading to widespread changes in the dental arches and jaws, the parents are encouraged to make every effort to preserve all the child's teeth in good condition. To achieve this, instruction is given in oral hygiene, and any caries is brought to the attention of the mother. Despite such measures, caries is common in the deciduous teeth of these children, and its correlation with the diet and oral hygiene is receiving attention.

The dental records have been analysed to determine the time and order of eruption of the second deciduous molar teeth. This investigation has been extended to cover the whole deciduous eruption of teeth in Australian children, with the use of records of normal children obtained from private dentists. Our tentative findings indicate that deciduous eruption times for the teeth of Australian children are similar to those recorded for North American children.

Orthodontic Examination.

Clinical assessments are made of the locking of dental cusps, the jaw relationships at rest and during movement, and the function of the related muscles. Cephalometric radiographs aid the appraisal, and are reviewed with reference to the records of the clinical orthodontic examination.

Dental Casts.

Dental casts are being made to record permanently the shape and size of the deciduous dental arches. These casts will be used, in conjunction with the cephalometric radiographs and the measurements made within the mouth and upon the face, to allow an accurate and complete orthodontic study.

Anthropometric Examination.

Standard anthropometric measurements are taken with spreading calipers and a constant tension flexible steel tape. In addition, anthropometric points are marked on the child in such a manner that they will be discernible in a photograph. The nude child then stands on a turn-table alongside a calibrated frame, and maintains a standard pose (Dupertuis and Tanner, 1950), while anterior, lateral and posterior photographs are taken. The pose is such that the plane of any length to be measured is parallel with the negative in at least one view. Measurements are made on the print with sharp-pointed dividers, the scale which appears on the same print being used for comparison. These data are used to analyse the varying individual body proportions during growth, and this information is correlated with the dietary and health records.

Skin-Fold Measurements.

The thickness of a double fold of skin and subcutaneous tissue is measured in seven sites by Harpenden calipers which exert a force of 10 grammes per square millimetre (Edwards *et alii*, 1955). These findings are used in the study of individual patterns of fat deposition and of their variation during growth and maturation.

Radiographs of the Left Hand, Foot and Ankle.

The radiographs of the hand are taken under the conditions for assessment of skeletal age that have been standardized by Greulich and Pyle (1950). The radiographs of the foot and ankle are dorso-plantar and antero-posterior views respectively taken with a tube-target distance of three feet (91·44 cm.).

These radiographs are used to assess skeletal maturity, because chronological age is an unreliable guide to the developmental progress of an individual child. The assessments of skeletal age can be used to understand the significance of variations from the mean in measurements of height and weight, and to predict adult height and the time of the menarche.

It was necessary to determine whether Australian children differed from overseas children in the rate of skeletal maturation before the standards for the latter could be applied to Australian children. The radiographs of the hand indicate that, between the ages of two years and five years (the period so far covered by the inquiry), the girls are maturing less rapidly than white American children of the same age by about one month, while at similar chronological ages the boys are maturing at the same rate. However, the difference in the case of the girls is not statistically significant, and consequently American standards of skeletal age can be used to assess accurately other local children over this age range.

These radiographs have also revealed numerous accessory ossicles and some unusual patterns of bone growth. Some

of these are well known in the literature, but others appear to have escaped attention, and are being investigated. For example, when ossification of epiphyseal centres in the hand and foot first begins, there are frequently multiple radio-opaque foci in the epiphyseal areas. Such changes were observed in almost all the children. This phenomenon has been noted by some previous workers, who have considered it to be a sign of either bone pathology or an uncommon but normal variation. However, it is clear that it is a common, normal appearance during childhood. This is the subject of a paper that has been accepted for publication by the *Journal of Bone and Joint Surgery*.

Cephalometric Radiographs.

Cephalometric radiographs are obtained with the use of a Bolton-Broadbent cephalometer (Broadbent, 1931). This instrument consists of head and cassette holders and two Röntgen tubes fixed so that the point source of each tube is five feet (152·4 cm.) from the mid-point of the trans-porionic axis. These tubes are aligned so that one will project a lateral radiographic shadow, and the other a postero-anterior shadow. The film cassettes are held at right angles to the respective central Röntgen rays. Measurements of the tissues of the head made on these radiographs are corrected for the known distortion and enlargement.

These radiographs already form the nucleus of an invaluable collection, with great potential for future research. Studies of the growth of the cranial base, the maxilla and the mandible are in progress.

Dietetic Assessment.

Dietetic assessments are made biannually. Throughout the week preceding the two visits in question, the child's mother records the exact quantities of food consumed by the child. The dietitian questions the mother to obtain more detailed information concerning this food record, the usual meal pattern, past dietary history and other relevant facts such as the texture and consistency of the food. Food models are used to assist in the quantitative estimation of foods eaten. The average daily consumption of significant foods is calculated by means of food composition tables, and the dietitian calculates the average daily consumption of fat, protein, carbohydrate, calcium, iron, vitamin A and carotenoids, thiamine, riboflavine, nicotinic acid and ascorbic acid. When the calculated intake of each specific nutrient is compared with the standard recommended intake tables, particular attention is given to those nutrients which are poorly stored within the body, e.g. ascorbic acid and thiamine.

If deviations from normal have been noted during the dental and medical examination (e.g. caries, skin diseases), particular attention is directed to those dietary faults which are known to be associated frequently with these conditions. In all children, the intake of substances with a high content of refined carbohydrate is estimated, since this may be significantly related to dental caries or to the imbalance of other nutrients. Attention is directed to the consistency of the diet, because this influences the growth of the jaws and the state of the oral soft tissues.

Many of the children have diets which are inadequate in respect to one or more essential food elements, while in some the consistency of the diet is unsatisfactory. Most of the recorded dietary abnormalities are associated with the child's refusal to take certain foods, and consequently the mothers find it difficult to effect the changes that are recommended. In some cases a real, or possibly an imaginary, allergic factor may cause a dietary imbalance.

The few previous longitudinal dietary investigations have dealt mainly with infants or with pre-school children. It is expected that as this investigation proceeds, it will provide further knowledge of dietary patterns in individual Australian children as they grow and develop. These dietary assessments are necessary for a complete analysis of physical growth.

Psychological Assessment.

In making a psychological assessment, use is made of the relevant data in the records of the pædiatrician, dentist and dietitian. The medical history, in particular, contains important information relating to housing, the number of people in the house, the incidence of family illnesses and the absence of parents or other children from the house.

The children are assessed with the use of the revised Stanford-Binet Intelligence Scale and the Terman-Merrill set of test material. The results of the tests are within or above the normal range. In some, the assessments show a rapid change, which is probably due to the inaccuracy of assessments made during the third year of life.

General.

During and after these visits each examiner discusses the child with the mother. In addition, a letter is written to the parents setting out those of our findings which they would understand and which are likely to be of interest to them. In these letters suggestions are often made regarding the management of the child, and copies of the photographs are included. Similar letters are sent to the child's private doctor and dentist, which state our findings and recommendations.

The main value of this research programme lies in synthesis rather than in analysis—in bringing together many divergent disciplines for the study of human physical growth. Despite the fact that each child involves a large amount of work, it may be thought that statistically our group is very small. In this regard it should be noted that longitudinal studies such as this have usually been conducted on relatively small groups—they yield their return in other ways than by sheer weight of numbers. To have even a few complete longitudinal records is to have reliable information which cannot be obtained in any other way.

Mongoloid Children.

The investigation of mongolism was undertaken in the belief that the effect of this condition on physical growth and maturation could be established. In addition, it was believed that data collected scientifically on untreated mongoloids would be of value in assessing the results of future therapy.

The majority of the 158 mongoloids being studied live in institutions under the care of the Mental Hygiene Authority of Victoria. The children vary in age, and about 20% of the group are over the age of 20 years.

Their assessment is based upon examinations which are similar in nature and frequency to those being made on the normal children.

Features of interest that are emerging from this study relate, *inter alia*, to the high vaulted palate, which is only seen after multiple extractions, a retardation of skeletal age, the frequency of bone scars near the ends of the shafts of the long bones, the incurving of the fifth finger, the space between the first and second metatarsals, the shape and size of the cranium, the fontanelles and the cranial sutures.

The ætiology of the disease is being investigated by means of interviews with mothers, in which particular attention is directed to the interval between pregnancies, to the relative infertility in the parents, and to any medical irradiation of the mother, father or fœtus at a time when it could have produced this change. To date 42 mothers have been interviewed.

Dwarfism.

Pædiatricians now realize that an undersized child cannot be scientifically appraised without an accurate knowledge of normal variations in the stature of other local children at the same age. Consequently, about 25 children with "dwarfism" have been referred from the Royal Children's Hospital, Melbourne. These children are assessed by the use of, whenever possible, our findings on normal children as the standard. In most of these, some part of the clinical picture can be ascribed to a slow rate of skeletal maturation, and in approximately one-third of them this factor is sufficient to account for their present lack of height. These slowly-maturing children are expected to grow for a longer period than most others.

Protective Measures in Regard to Radiation.

Caffey (1956) has written:

> It is a pity that, 60 years after Roentgen's discovery of X-rays, knowledge of the normal is still so defective—a deficiency which can be overcome only by a comprehensive study of healthy infants and children of all ages.

We hope that our investigations will, in part, overcome the deficiency. From the beginning of the study, particular attention has been devoted to protecting the children from possible harmful effects of radiation. The late Dr. C. E. Eddy, Director, Commonwealth X-Ray and Radium Laboratory, and his successor, Mr. D. J. Stevens, gave detailed consideration to this problem, and supervised the protective measures and the general planning of the radiographic study, which is being carried out with techniques and ancillary protective devices designed to reduce the radiation doses to tissues to minimal levels.

We are using modern shock-proof X-ray equipment and radiographic techniques which reduce to a minimum the dose to the part under examination. All X-ray tubes are fitted with cones and diaphragms, so that the direct X-ray beam just covers the area of interest. In addition, the following measures are adopted to protect the subject from indirect and scattered radiation. During radiography of the hand and foot, a lead-impregnated plastic drape hangs from the X-ray tube in front of the seated child, and the appropriate part of the body is placed upon a table through a slit in this screen, so that the remainder of the body is protected. When cephalometric radiographs are being taken, a lead-impregnated plastic drape placed over the patient protects the front of the body from scattered radiation. For the lateral view, an additional lead-impregnated plastic drape is placed between the tube and the subject to protect the whole body below the mid-cervical region. This drape has added to it an additional shield of lead to ensure protection of the thyroid gland from direct and indirect radiation. In the postero-anterior view, radiation measurements have shown that the cephalostat cabinet and the back of the dental chair in which the subject is seated during cephalometric radiography provide protection from direct and indirect radiation for the whole of the body except the part under examination.

Because the gonads are shielded and are distant from the parts of the body under examination, it would be expected that the amount of radiation received by them would be very small indeed. Measurements and calculations carried out on every child at every examination continue to confirm this, and indicate that the maximum radiation dose to the gonads of an individual during the full course of the investigation will not exceed 2% of the radiation dose inevitably received by the gonads of the individual from the average natural radiation background in the same period. It should be pointed out here that this constitutes a negligible dose from a genetic point of view. Measurements and calculations have also shown that the radiation dose to other organs, which may be of special interest from the radiation hazard viewpoint (e.g. the thyroid gland), is reduced to insignificant levels by the practices adopted.

At all examinations, radiation monitoring films are placed at selected sites on all subjects to check that the levels of radiation referred to are not being exceeded.

If a radiograph is unsatisfactory, the child is not brought back for a repeat X-ray examination. Consequently, the scheduled number of X-ray examinations represents the maximum.

Furthermore, if future generations are to be exposed to increasing amounts of radiation, it will be necessary to estimate the effect of such an increase on normal body structure and function. This would require an accurate picture of the range of normal variation, lest normal findings should be attributed to increased radiation in the community.

Conclusions.

In these days of technological advance it must not be forgotten that the most important research instrument is still the human mind, and that the most important diagnostic record to be studied is still the patient.—J. R. THOMPSON, 1954.

It is essential to establish patterns of normal growth before variations from these can be assessed accurately. Such patterns must be obtained over the whole period of growth, and are clearly of the greatest importance to the welfare of children in this country. The present study is still in its early stages, and the full benefits will accrue only as the age range covered by the investigation increases.

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Such a project would be impossible without the cooperation of many people both inside and outside the Department of Anatomy. Particular mention must be made of Mr. D. J. Stevens and Mr. D. J. Grant of the Commonwealth X-Ray and Radium Laboratory, Mrs. A. Cahn of the nutrition section of the Biochemistry Department, University of Melbourne, Dr. N. Andrews, Mr. J. Jago and Miss M. Stubbs of the Department of Health, the officers of the Mental Hygiene Authority, and the staff of the Melbourne University Child Growth Study. In addition, we gratefully acknowledge financial assistance provided by the Nuffield Foundation, the University of Melbourne, the Mental Health Research Fund and H. J. Heinz Co. Pty. Ltd. Despite the help of all the above-mentioned, little would be achieved without the generous cooperation of the mothers of the children included in the survey.

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A COMPARATIVE STUDY OF CHLORPROMAZINE AND PHENOBARBITAL IN THE CONTROL OF DISTURBED BEHAVIOUR IN A GROUP OF LONG-STAY PSYCHOTIC PATIENTS.

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THE use of chlorpromazine in the management of agitated chronic psychotic subjects has been described by Mitchell (1956), Andermann and Lindsay (1955), Thorpe and Baker (1956), Baker (1955), Bowes (1956), Winkelman (1957) and others. These reports have emphasized the usefulness of this drug in psychiatric conditions characterized by hostility, aggressiveness, etc.

During a temporary shortage of chlorpromazine in the early part of 1955, we observed that, by substituting phenobarbital, we were able to obtain a comparable effect. This observation led us to believe that, while it is necessary to establish the therapeutic effect of a new drug, it is equally necessary to prove that such a drug is safer, cheaper and more effective than the older drug. That barbiturates are cheaper cannot be disputed, and much can be said for the view that they are safer.

For these reasons, we decided to institute a comparative survey of the relative therapeutic effects of chlorpromazine,

phenobarbital and a placebo in the control of the disturbed long-stay patient. The experiment was conducted at Mont Park Mental Hospital, Victoria, during the last four months of 1955.

Assessment and Selection of Patients.

After discussion, we agreed that the term "disturbed behaviour" can be applied to a wide range of symptoms that may be present in a patient. For the purposes of this study, we agreed to inquire into the presence and degree of five different kinds of disturbed behaviour, namely, noisiness, destructiveness, violence, restlessness and incontinence of urine. A six-point rating scale was devised for each, the score being determined by the frequency and severity of the symptoms, 0 denoting absence and 5 denoting extreme degrees of disturbed behaviour. The total rating score for a patient could therefore range from 0 to 25 points.

As a result of careful assessment, account also being taken of reports from the nursing staff, 34 males and 46 females were selected for further examination. During a period of seven days, all 80 patients were independently assessed by both investigators. Results were averaged for each patient, and only those found to have a total rating of 5 and above were selected for the trial, which left 12 males and 24 females. The 12 males were placed in the same ward with some 80 other long-stay patients not under investigation. Similarly, the females were placed in a ward together with 50 other long-stay patients.

Interscorer reliability was calculated at this stage, and suggested that both workers were in substantial agreement about the degree of "violence", "noisiness", etc. displayed by the patients.

A review of the various suggested dosages for oral administration of chlorpromazine led us to believe that a working dosage of 150 mg. per day would prove to be adequate. In order to make a true comparison between chlorpromazine and phenobarbital, we decided that we should determine the dosage of phenobarbital which would lead to a therapeutic response without somnolence. One of us selected eight disturbed patients who had been rejected during the selection of the experimental groups, and divided them into two groups. One group was given three grains of phenobarbital three times daily (Group A), and the other group two grains three times daily (Group B). The patients in both groups were scored at weekly intervals for four weeks. Slight to severe somnolence occurred in three cases from Group A, but all tolerated therapy when the dosage was reduced to two grains of phenobarbital three times daily. At no stage was somnolence noted in patients from Group B. Patients in both groups appeared to be less disturbed. We concluded that we could reasonably expect six grains of phenobarbital per day to give the maximum therapeutic effect without somnolence.

In order to maintain objective assessment during the clinical trial, it was desirable that all three substances should be identical in appearance. The chlorpromazine was supplied as the customary white, ovoid, sugar-coated tablet containing 25 mg. of the drug. Placebo tablets and tablets containing one grain of phenobarbital were made with an appearance identical to the chlorpromazine tablets. All 36 patients were then assessed at weekly intervals during a three-week pre-treatment period. An average of the three scores thus obtained yielded the mean pre-treatment score. Male and female patients were allocated to membership of three groups, consisting of four members in the case of males and eight members in the case of females. The groups were matched for total score and behaviour profile, and were identified as Group 1, 2 or 3. The three groups were then subjected, in rotation, to the three forms of therapy as shown in Table I.

Before each change of medication, a rest phase of three weeks was allowed in order to prevent carry-over effects from the previous drug. In the case of the female series, this period of rest was one week. So that the nursing staff would not know that the mode of therapy had been changed, placebo tablets were administered during the rest periods, but no account was taken in the experiment of the ratings made at these times. The assignment of labels 1, 2 and 3 to each group was the responsibility of the hospital pharmacist, and not until the completion of the trial was the key made available to the investigators. Similarly, it was the responsibility of the pharmacist to issue tablets in unlabelled boxes in accordance with the treatment scheme. It was our experience that at no stage were the investigators, staff or patients aware of which drug was being used at a particular time.

TABLE I.
Rotation of Three Forms of Therapy.

Group.	First Three Weeks' Treatment.[1]	Rest Period.	Second Three Weeks' Treatment.	Rest Period.	Final Three Weeks' Treatment.
1	A	B	B	B	C
2	C	B	A	B	B
3	B	B	C	B	A

[1] A, chlorpromazine; B, placebo; C, phenobarbital.

A standard instruction was issued to the staff, ordering the administration of two tablets three times daily. In this way, each patient received either six placebo tablets, 150 mg. of chlorpromazine or six grains of phenobarbital each day.

Weekly assessment scores were made of each patient during the entire 18 weeks' period of the experiment. Assessments were determined from the personal examination by the rater, in conjunction with reports from the nurse in charge of the ward.

Results.

1. There was universal agreement between the two investigators and the nursing staff that at no stage were they aware of the type of drug being used.

2. It was also agreed that improvement in behaviour was apparent from the time the experiment commenced, i.e. behaviour was already becoming tranquillized during the off-treatment period preceding the first administration of the tablets under investigation. (One female patient, who was an exception to this, became so disturbed shortly before the first treatment period that it was necessary to give her electroconvulsive therapy and to exclude her from the series.)

3. Further tranquillizing effects of the treatment as a whole were noted after the conclusion of the experiment. (In the case of the female group, there was a statistically highly significant drop from the mean before-treatment score to the mean after-treatment score. The reduction in disturbed behaviour, over the same period, in the male group was statistically not significant, possibly because of the small number of cases in this group.)

4. There were no statistically significant differences between the effects of chlorpromazine, phenobarbital and placebo respectively.

Discussion.

Since the time of this study, recommended dosage schedules for chlorpromazine have undergone considerable change. It would be reasonable to question the dosage of chlorpromazine used in this study, but it should be noted that phenobarbital in the dose employed, and a placebo, led to an equal reponse, which cannot be explained on a pharmacological basis.

It could be suggested that the reduction of disturbed behaviour resulting from the effect of the active drugs given to two-thirds of the patients reduced the environmental stress on the placebo groups, thus having an indirect tranquillizing effect. Unfortunately, the design of the experiment does not allow us to test this possibility. However, this explanation does not seem likely in view of

the observation that all patients' restless, destructive, etc. behaviour was tranquillized during the off-treatment period prior to the experiment. We must assume that this was due to the psychological effect on the patients of their move from their various wards to a common ward, with its changed staff attitudes and surroundings.

In retrospect, it seems unfortunate that longer rest periods were not interpolated between the treatment periods so as to eliminate the possibility of carry-over phenomena, though we doubt, in the light of subsequent experience, that this would have affected the situation to a significant degree.

A further limitation of this trial study was the small sample of patients available for the experiment. Owing to the relatively small number of patients employed, it proved impossible to test whether certain types of patients have different reactions to the different forms of therapy. Our experience was in accord with that of Turner *et alii* (1958), who, investigating reserpine by comparative study, found it necessary to restrict the size of the experimental group so that they could be assessed adequately and accurately.

The findings of our own study may be interpreted as indicating that the tranquillizing of our patients' behaviour was due, not to the active constituents of the tablets, but to the psychological effects of the treatment and extra attention they received from the medical and nursing staff.

Summary and Conclusion.

A controlled comparative study has been made of the effect of three substances, two active, one inert, upon the disturbed behaviour of long-stay psychotic patients in a mental hospital. A reduction in disturbed behaviour was noted during the period preceding the actual trial, while patients were off all treatment. Further tranquillization was observed after the conclusion of the 18 weeks' trial. There were no statistically significant differences between the effects of the three substances, namely, chlorpromazine, phenobarbital and placebo, respectively.

It is suggested that the reduction in disturbed behaviour, which occurred prior to the experiment, was due to the psychological effect on the patients of their move from their various wards to a common ward, with its changed staff attitudes and surroundings, and that the further tranquillization of our patients was due, not to the active constituents of the tablets, but to the psychological effects of the treatment and extra attention they received from the medical and nursing staff.

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We wish to thank the Mental Hygiene Authority for permission to publish these results. Our thanks are due to Dr. A. Stoller, Chief Clinical Officer, for encouragement and help in carrying out this investigation, and to Mr. F. Boyd, the Chief Pharmacist, who bore so much of the burden of this investigation. We acknowledge the help given by the nursing staff, who bore with tolerance the difficulties met with during the course of this investigation. To Mr. J. Lyle and Dr. H. H. Hohne, Departmental Research Psychologists, we tender our thanks for the statistical analysis of the results.

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THE USE OF "ANSOLYSEN" IN PAROXYSMAL NOCTURNAL PARÆSTHESIA DUE TO THE CARPAL TUNNEL SYNDROME.

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Paroxysmal nocturnal paræsthesia is a fairly common condition and a very distressing one. It is currently known as the carpal tunnel syndrome, in which the median nerve is compressed in the carpal tunnel. The actual cause of the condition and the mechanism of the pain production are not fully understood. I am reporting the use of "Ansolysen" in these cases for two reasons: first because it gives considerable relief in many cases, and secondly because it may throw some light on the ætiology of the condition. I have not seen any reports of its use for this purpose in the literature.

As fairly numerous articles have appeared recently about the carpal tunnel syndrome, I will not go into any great detail of its clinical picture. It occurs most commonly in middle-aged women. The characteristic feature is that patients wake up after some hours' sleep with painful tingling and burning in one or both hands. The pain may at times spread up the forearm and even up to the shoulder. Patients say that their hands feel numb and useless during the attacks and are swollen at times in the morning. Relief is obtained by rubbing the hands or by getting out of bed and walking round. As the condition gets more severe, the symptoms occur during the day. In severe cases, sensory and motor changes can be detected in the distribution of the median nerve.

Reports of Cases.

Case I.—Mr. A., a labourer, aged 52 years, was the first patient to be given "Ansolysen". He had complained of nocturnal paræsthesia for one year before being given "Ansolysen" on October 13, 1956. This produced immediate relief from his symptoms at night, but he still complained of morning symptoms. A small dose of "Ansolysen" in the morning relieved these also. Whereas previously he used to walk about for half the night trying to obtain relief, he can now sleep all night and does not even need the morning dose of "Ansolysen". He had no physical findings in his hands, and X-ray examination of the cervical part of the spine gave normal findings.

Case II.—Mrs. B., a housewife, aged 52 years, had had nocturnal paræsthesia for two years. These symptoms gradually increased till they occurred during the day. "Ansolysen" in a dose of 40 mgm. at night completely relieved her nocturnal symptoms, and three doses each of 20 mgm. during the day relieved her day symptoms to a reasonable degree. X-ray examination of the cervical part of the spine showed moderate arthritic changes.

Case III.—Mrs. C., a housewife, aged 49 years, had complained of nocturnal paræsthesia for one year, but obtained complete relief from "Ansolysen".

Case IV.—Mrs. D., a housewife, aged 56 years, had complained of nocturnal paræsthesia for six weeks and obtained immediate relief from "Ansolysen" taken at night.

Case V.—Mrs. E., a housewife, aged 45 years, complained of nocturnal paræsthesia for 12 months. Complete relief was obtained from a dose of 40 mgm. of "Ansolysen" at night.

Case VI.—Mrs. F., a barmaid, aged 42 years, had complained of nocturnal paræsthesia for 12 months. Before being given "Ansolysen" she had also developed severe daytime symptoms. "Ansolysen" did not produce much relief in her case. Bilateral division of the flexor retinaculi was performed, which relieved her symptoms. She also has stenosing tenosynovitis of the flexor tendons to both hands.

Results.

As can be seen, all patients except the patient in Case VI obtained considerable relief from "Ansolysen". In this case the condition later advanced, and the patient suffered continuous severe pain during the day as well as by night. She had both flexor retinacula divided, which produced immediate relief. At operation, compression of the median nerve was seen.

In most cases the dose of "Ansolysen" used was 40 mgm. at night. Sometimes this had to be repeated during the night to produce complete relief. If it is given at night in this dosage there is no risk of any hypotensive effect. For the few patients who had day-time symptoms I used only 20 mgm. three times a day, so that there would be no hypotensive effect. This dosage relieved the symptoms, but sometimes not completely.

Discussion.

The present accepted theory of the causation of paroxysmal nocturnal paræsthesia is that of compression of the median nerve in the carpal tunnel. However, there is still some controversy as to why the median nerve is compressed, and also as to the mechanism of production of the nocturnal pain and paræsthesia. There can be no question that median nerve compression is the cause, as when the compression is relieved the symptoms disappear. However, the anatomical compression does not appear to be the only factor, as in some cases the median nerve is seen to be not compressed at operation, yet symptoms are relieved after division of the flexor retinaculum (Kremer *et alii*, 1953; Garland and Bradshaw, 1957).

The following are the mechanisms by which the median nerve may be compressed in the carpal tunnel: arthritic changes in wrist joints, fractures of neighbouring bones, diseases of tendons or their sheaths, or thickening of the flexor retinaculum. Phalen and Kendrick (1957) report 71 cases and consider that the most common cause is chronic inflammation of the tendon sheaths. They term it chronic non-specific proliferative tenosynovitis and state that it occurred in 70% of their patients (proved by operation biopsy). Garland and Bradshaw (1957), in 35 patients operated on, reported seeing abnormality in only 30% of them. However, it is obvious that abnormality can be frequently seen.

Any of these conditions, and the constriction of the median nerve which is sometimes apparent, can be seen at operation. If these factors were the only ones active, the symptoms should be continuous once they started. Until relatively late in the course of the disease they occur only at night, although in advanced cases with considerable constriction the symptoms may be continuous. Hence some other factor must operate at night. The obvious explanation is that there is nocturnal swelling of the tissues neighbouring the nerve and thus increasing the pressure on it. Venous congestion in the hands may be caused by lying on the arms at night or by dropping of the shoulder girdle during sleep, causing venous compression in the root of the neck.

These patients frequently complain that their hands are swollen in the morning and that they have difficulty in getting rings off their fingers. This swelling subsides during the day. The relief that patients obtain by moving and rubbing their hands would be explained by the fact that it would lessen the venous congestion due to increased venous return. As most of these patients are middle-aged women, endocrine factors have often been postulated to explain the œdema. This could certainly be a contributing factor. Pregnant women occasionally get paroxysmal nocturnal paræsthesia, and this could be explained on a similar basis, i.e. that the endocrine changes cause fluid retention in the body and so raise the pressure in the carpal tunnel to such a level that the nocturnal factors as outlined above will precipitate the symptoms. Wallace and Cook (1957) report two cases of carpal tunnel syndrome in pregnancy. Hence a likely explanation of the nocturnal symptoms in the carpal tunnel syndrome is that pressure in the carpal tunnel is first raised by some anatomical abnormality or endocrine factor. At night venous congestion then raises the pressure beyond the critical level and symptoms are produced.

Symptoms are always worse when the patients have done heavy work with their hands on the preceding day. This may be due to the fact that the constant flexion and extension of the wrist cause some œdema. Another possibility is that the movement causes minimal trauma to the nerve during the day and renders it more easily stimulated by night.

The mechanism of production of the paræsthesia, however, is something about which little appears to be known. The fact that "Ansolysen" produces relief in the milder cases throws some light on the problem. The effect of "Ansolysen" is to produce an inhibition of nervous transmission between pre-ganglionic and post-ganglionic neurons of the autonomic nervous system, i.e. only on the motor or efferent part, as the sensory autonomic fibres have direct central connexions, the same as somatic sensory fibres. This is of course because the posterior root ganglion has central and peripheral fibres. It has been proved (Mitchel, 1953) that autonomic sensory fibres can conduct pain, but "Ansolysen" has no effect on them and hence that cannot be the explanation.

Simpson (1956) produced evidence that there is slowed conduction in the fibres of the median nerve in cases of the carpal tunnel syndrome. He also showed examples of repetitive firing of motor units in some cases due to the compression. He quotes Kugelburg (1946) as stating that a similar phenomenon in sensory fibres would explain paræsthesia and pain in certain circumstances.

It seems possible that the stimulus to the median nerve caused by the compression sets off such a train of sensory stimuli. This may be in the somatic fibres or in the sympathetic fibres. If these were in the sympathetic fibres (or even in the somatic fibres, as there are central connexions), the stimuli would pass to the posterior root ganglion and the central connexions from them could form a local reflex arc with a motor root of the sympathetic. Most sympathetic sensory fibres end in the cord in contrast to somatic fibres. Axon collaterals run vertically and transversely, so providing associative and commissural connexions. From the sympathetic motor root the impulse would pass through a sympathetic ganglion and thence down the post-ganglionic fibres in the spinal nerve supplying the arm where the stimuli arose. This would produce vasoconstriction of the vasculature of the nerve, producing pain and paræsthesia. "Ansolysen" would be effective by blocking the stimuli at the sympathetic ganglion and hence preventing vasoconstriction of the vessels supplying the median nerve.

The distribution of the sensory symptoms in the carpal tunnel syndrome may be wide, being from hand to shoulder. This would be explained by the presence of vertical axon collaterals in the central connexions of the sympathetic reflex arcs.

Often operation on the worse side in bilateral cases will produce relief on both sides. This can easily be explained by the commissural connexions producing nerve ischæmia on the other side. With the relief of pressure on the affected side there is no primary stimulus and so no symptoms on either side. This, of course, does not apply to cases of bilateral compression.

Gilliatt *et alii* (1953) describe the use of the tourniquet test. In this the circulation to the arm is occluded with a sphygmomanometer cuff, and within a short time patients with the carpal tunnel syndrome develop pain and paræsthesia in their arms. This could be explained on the above-mentioned theory in two ways. First, there would be some rise in tension in the arm, as there is always a short delay between occlusion of the venous return and arterial occlusion. This would cause an increased volume of blood in the arm and thus increase the tension in the carpal tunnel. The second reason is that there is probably minimal ischæmia of the nerve all the time owing to reflex vasoconstriction. The added ischæmia due to arterial occlusion would be enough to produce symptoms in the median nerve.

Conclusion.

The whole theory as outlined has been tentatively postulated to explain the symptoms of carpal tunnel syndrome and the action of "Ansolysen" therein. It appears to fit in well with the facts, but some points need confirmation. For instance, it would have to be considered whether the

mode of action of "Ansolysen" is in decreasing the slight œdema that occurs at night in the hands of patients with paroxysmal nocturnal paræsthesia. It seems difficult to reason how this could take place, but further work would be needed on the subject.

Finally, it should be stated that the use of "Ansolysen" is advocated only in mild cases. Those patients with troublesome day symptoms and certainly those with physical findings due to median nerve compression need surgical treatment.

Summary.

The use of "Ansolysen" for the relief of paroxysmal nocturnal paræsthesia in mild cases of carpal tunnel syndrome is described.

It is postulated that the symptoms are due to reflex ischæmia of the median nerve and that the mode of action of "Ansolysen" is to interrupt this reflex arc. Compression of the median nerve in the carpal tunnel is the primary cause.

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MENTAL DISORDERS IN MIGRANTS: FURTHER STUDY.[1]

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Emotional problems — at times taking the shape of mental disorders—in migrants lend themselves conveniently to discussion from two angles. First, there is the emotional and mental disorder in the migrant as an individual, and secondly, the emotional disorder in migrants as a group. The individual aspect of the problem was discussed in a previous paper on paranoid states in migrants. It is intended to discuss in this paper emotional and mental disorders in migrants as a group. That will necessarily involve also a discussion of certain emotional problems occurring in the host group.

There is no doubt that collective morbid emotional reactions do exist in migrant groups on arrival. Some of them are peculiar to a certain national or cultural group, others occur in all migrants. Landing anxiety and fear of the unknown exist in every migrant. In turn these states of emotion create responses in the population on shore, for instance, prejudice against the unknown, increased fears of economical insecurity, etc. This relation between the group neurosis in migrants and the group neurosis in the local population is the theme of the present discussion.

[1] Read at a meeting of the Section of Neurology, Neuro-Surgery and Psychiatry, Australasian Medical Congress (B.M.A.), Tenth Session, Hobart, March 1 to 7, 1958.

Principles of Group Psychology.

Before the pathology of group interrelations is discussed, attention is drawn to the principles of group psychology. Each individual belongs to a primary group, represented by his family, and later to a secondary group, represented by the State. Both groups tend to restrict the flexibility of the individual, the primary group earlier in life, the secondary group later. While melting into the primary and secondary groups the individual notices the presence of other groups on his periphery: the out-groups. He notices further differences between his in-groups and the surrounding out-groups. He does not belong to these out-groups, and because of that he has a stronger feeling of belonging to his in-group, both primary (family) and secondary (State). He identifies himself with these in-groups and develops sympathy and love for them. Towards all other groups he is in a state of envy, rivalry, aggressiveness or hate.

Group Psychopathology as Applied to Migrants.

The migrant group is usually not homogeneous and *a priori* exposed to a head-to-head collision with the more homogeneous host group. A conflict arises from opposing attitudes. Every conflict breeds neurosis.

In the migrant group, the neurosis, if we may call it so, presents itself as collective anxiety. This anxiety is unavoidable and is due to many environmental insecurities like moving into a new culture, new climate and new work, etc. It is also due to a neurotic attitude in the host group — prejudice. Prejudice in the host group was discussed in detail by Blake-Palmer (1956). According to this author:

> Prejudice, in common parlance, indicates an habitual unfavourable or hostile bias towards its object. Prejudice almost inevitably leads to discrimination. Indeed, it may be defined as "the mental state corresponding to the practice of discrimination". I use the word "discrimination" in the sense of "distinguishing unfavourably" not "distinguishing with fine judgement".

Prejudice in the host group is counteracted by a drive to assimilation in the migrant group. Cultural assimilation is defined as "the process of interpenetration and fusion in which persons and groups acquire the memories, sentiments and attitudes of other persons and groups and are incorporated with them in a common cultural life". This conflict between prejudice and assimilation feeds the collective neurosis both in the migrant and in the host. Needless to say, the migrant's part in this relation is greater.

Clinical Pictures of Collective Neurosis in Migrants.

We conclude, then, that the migrant population suffers from a collective anxiety state, so to speak, on arrival or even before arrival. It is due to the sudden change in living conditions, but it is also due to a psychological conflict between prejudice and assimilation. It occurs in every migrant group, and does not depend on origin, race or nationality. It is a social disease, and has a frequency of one in one. It requires treatment. The treatment is psychiatric, and the psychiatrist is the local population and/or its specialized sections.

Let us return, before we go into treatment, to the presenting clinical pictures. The differences in clinical pictures are due to the different defence mechanisms used.

Regression.

Regression to an earlier stage of development will produce a collective neurosis, in which the migrant group will resist assimilation by gravitating to its country of origin. We have numerous examples of it. The stage for protection is set in social agencies established by the diplomatic representatives of the respective country of origin. Although these agencies have not the power

invested in local social bodies, they have a strong emotional attraction. Further, migrants will miss no opportunity to support visiting teams of artists or sportsmen, cultural exhibitions or works of trade coming from their own country. They will also support local teams or exponents of their own country. This drive to regression and parent-child relation is so strong that it overrules strong political or racial hostilities. For instance, during the Olympic games, teams coming from politically unacceptable countries still had full support of local migrant groups. Another sign of regression is the forming of and the belonging to local national societies, clubs, etc. These bodies are usually poor in proceeds and unable to offer much, but there is the driving force of imaginery revival in an old life situation, with the phantasy of protection and security.

Paranoid Projection.

Paranoid projections of the migrant's own fears onto others, leading to delusions of grandeur and/or aggression to others, is another frequent defence mechanism. Migrant groups have a tendency to glorify certain, perhaps unimportant, characteristics of their behaviour, dress, habits or food. But they not only glorify their own; they also depreciate the behaviour, dress, habits or food of the local population. It is hoped that in this way the individual's own weaknesses will be camouflaged and projected onto other members of his own or an alien group.

Escapism.

Escapism, not in the past but from responsibilities, leading to inactivity, is another defence mechanism. One finds a much greater amount of absenteeism from work in migrants than in locals. This absenteeism occurs after industrial accidents, car accidents and sickness, and is attributable to a greater tendency to escape from the endangering and anxiety-producing environment.

Depressive States.

Depressive states are due to introjected aggression to the host population. It is well known that in certain hostels or other migrant groups depression prevails temporarily or permanently. These communities remain poor and cases of multiple suicides are known.

Escape into Activity.

Escape into activity leads to hypomanic states. Part of some professional successes achieved by migrants and their drive to excessive work can be explained by this mechanism. That, of course, increases prejudice.

Inferiority Complexes.

Inferiority complexes are amazingly rare. Probably other defence mechanisms take care of compensations. Very few migrant groups feel really inferior to the host population. On the contrary, they are inclined to glorify their past.

Craving for Sympathy.

Hysterical craving for sympathy and dependency is frequent. Every migrant group suffered sometimes in the past. There is a particular sort of neurotic self-pity and a tendency to exhibitionistic and masochistic ruminations. There is a need for speaking about their past and being admired for what they suffered. Nothing worse can happen to them than not to be listened to or understood. That attitude could be compared with similar attitudes in returned soldiers.

The Host Population's Attitude and Counter-Reactions.

The local population is *a priori* prejudiced from emotional, intellectual and economical reasons. It may realize the wrongness of these attitudes and to counteract them creates professional bodies to deal with prejudice. These bodies are governmental, semi-private and private. Their action is directed towards creating a need for assimilation in migrants. It is explained by way of logical argument to everybody who is new that he must stop being new and must become old. These aims are achieved in different ways and are rather successful. But what is not done, or not done to the extent requested, is an action directed towards the host population to help it digest the new population. The Press is not very helpful in this respect. I should think that in certain Press exhibitions there is not only the news value; there are certainly other forces behind, which I do not wish to discuss.

The question arises whether prejudice is responsible for the collective anxiety state. It appears that it is partly so. We arrive at a conclusion that the party which has to help or treat is emotionally disturbed itself. Certain counter-reactions take place on both sides. They are automatic, self-regulatory and do not require much stimulation. However, they may appear not to be defence mechanisms, and may increase prejudice on one side and anxiety on the other. For instance, on the migrant's side, the formation of their own cultural groups, adherence to their own diplomatic representatives and absenteeism from work may increase prejudice. And on the local population side, bureaucracy, registration and governmental machinery may cause more anxiety and fears.

Of particular importance is the question of children in migrant groups and in host groups. Migrant children become host children to their parents and exercise prejudice towards them. The child acquires attitudes, likes and dislikes more easily than the adult. Children may be more cruel and therefore more likely to be prejudiced. The emotional problems invested in migrants themselves are likely to become more pronounced in their children. It is the general opinion that it is the contrary. I feel that the second generation is in a difficult position. Children are thrown between two patterns of culture—what they see at school and what they see at home. These differences are obvious. The result is that children usually become prejudiced toward their own parents, the reason being that children between themselves form a more self-contained group than adults, and they soon become host children to their own parents. This is a very dangerous situation and another cause of resentment on the migrants' side.

Treatment of Emotional Disorder in Migrant Groups.

The collective anxiety state occurring in various forms in migrant groups definitely requires treatment. It is a social disease and therefore the treatment should be on social level. Manipulation of the environment is of primary importance, particularly so as these groups frequently have no leader, are not homogenous and are often more a crowd than a group. Both prejudice and anxiety are neurotic in origin, and both may act to the detriment of the group in the community.

The question of social psychiatric treatment here on the spot of both migrant and host groups is of particular importance for three reasons: (*a*) Every migrant presents an emotional problem, a potential danger of an emotional disorder or even of a mental disorder, if not dealt with early. (*b*) The selection of emotionally stable migrants in their country of origin is impossible. Redshaw (1956) states that "the use of a foreign language, the absence of medical records and a shortage of trained psychiatrists in the particular countries make it even more difficult". (*c*) Emotionally stable people have less tendency to migrate.

The avenues of approach to individual migrants' emotional difficulties were outlined in my previous paper and are summarized again without discussion: (i) encouragement to learn the native language; (ii) continuation of the use of the mother language; (iii) encouragement to marry and to establish families; (iv) encouragement to form national and cultural societies and clubs; (v) desensitization from paranoid reactions to authorities (police, government, etc.).

The following suggestions are made for the management of emotional difficulties in migrants as groups, on the

assumption that these difficulties exist in every group on arrival.

1. To combat intellectual prejudice on the host side and anxiety reactions on the migrants' side, accurate information about respective countries of origin and about Australia should be supplied. This information is best supplied in the form of public lectures given by representatives of respective countries.

2. To combat emotional prejudice and tensions, all concerned should be educated in group psychology, neurotic patterns of behaviour and defence mechanisms used. This education should be provided by psychiatrists, psychologists and social workers.

3. Prejudices, ignorance and hostility should be inhibited and assimilation encouraged with all available means in children in school. Both host children and migrant children should be considered as potential dangers and treated accordingly. The responsibility of these activities falls here on teachers. They should, of course, be pre-educated to combat prejudices in themselves before they proceed to erase them in others. They should also encourage parents to assimilate in the home their children's patterns of behaviour which they learn at school.

4. Sensational Press reports should be curbed. Criminals are criminals, and neurotics are neurotics. It is true that some migrant groups are inclined to disorderly behaviour. That comes under their "acting-out" neurotic mechanisms. It is further true that some migrants are criminals, and as such they cannot be excused. It is advisable, however, not to create prejudice by conveniently confusing the problems concerned.

5. The naturalization ceremony is extremely important. It is a symbolic expression of acceptance. It partly does away with the in-group versus the out-group antagonisms. It should carry as much pageantry as possible.

6. Detention of migrants in camps, although at times unavoidable, carries another danger of group separation and makes assimilation more difficult. Kino described outbreaks of psychotic reactions in migrant camps, and so did others. Children in camps are educated in separate schools, and their parents teach them intolerance. The authority exercised by the government is more visible and the conditions of living, if not lower, appear to be lower than those of the host population, owing to segregation.

Summary.

Migrants arriving in this country and in any other country present an emotional problem. Each group of migrants is affected by a collective neurosis of the anxiety type. That is partly due to migration stresses and partly to a head-to-head collision with another neurotic reaction in the host group called prejudice.

Migrants belong to an in-group, which is not homogeneous, consists of a crowd and has no leader. On arrival they meet a homogeneous and bigger out-group, the host group. A conflict arises, and it leads to several types of neurotic reaction, according to the defence mechanisms used.

These neurotic reactions are classified for descriptive purposes as regression, paranoid reactions, escapism, depressive states, hypomanic states, inferiority complexes and hysterical reactions.

The attitudes and counter-reactions of the host group are further discussed. They are powerful and are used with success for the treatment on a social level of the collective neuroses of migrants.

The problem of children is of special importance, and the reasons are given why migrant children face more difficulties than their parents, owing to the conflicting influence of home and school.

Suggestions are made that the emotional disorders in migrants should be treated on a social level. Education is of primary importance. It should include accurate information about respective countries and teaching in neurotic patterns of behaviour. Teachers should try to erase prejudices and to encourage assimilation in both parents and children.

If sensational Press reports were curbed, migrant camps reduced or abolished, and the naturalization ceremony given a higher factual status, migrants would be further assisted in combating their emotional disorders.

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Reports of Cases.

DEATH FOLLOWING THE USE OF "XYLOCAINE" FOR LOCAL ANALGESIA.

By R. W. SINCLAIR,

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IN obstetrical cases in which local analgesia is to be used during the delivery, pudendal nerve block with "Xylocaine" (lignocaine, also "Lidocaine" etc.) is relatively safe and is rarely followed by toxic reactions. It appears, from a study of the following case and from the previously reported studies of the toxicity of "Xylocaine", that in regard to this very useful and satisfactory procedure any unnecessary risk, which might endanger the lives of such young mothers, could be eliminated.

Clinical Record.

The patient was a primipara, aged 21 years, with no family or personal history of fits. The antenatal records revealed a history of some hæmorrhage *per vaginam* at three months, which subsided. The X-ray pelvimetry report stated as follows:

> The pelvis is gynæcoid in type with several of the measurements, i.e. bispinous, A-P midplane and A-P outlet, on the lower limits of normal. The fœtus presents as a breech with extended legs and upper spine. Conclusion: Even if the fœtus turns into a vertex presentation there may be delay at the midplane and outlet but this should not be of a serious nature.

External version was attempted unsuccessfully at 34 weeks.

Labour commenced at about 6 a.m. on December 29, 1957, and on the patient's admission to hospital, breech presentation was confirmed with a small piece of very old blood clot present near the cervix. The blood pressure was 90/60 mm. of mercury. At 2.20 p.m. 100 mgm. of pethidine were given intramuscularly, and the second stage of labour began at 3 p.m. Pudendal block was performed at 3.25 p.m., with the use of 20 ml. of a 2% "Xylocaine" solution with epinephrine, and the perineum was infiltrated with 10 ml. of a 2% "Xylocaine" solution with epinephrine. Meticulous care was taken not to inject into a blood vessel, and no return of blood was observed in either the syringe or the needle during the whole procedure. At about 3.35 p.m. the patient suddenly started to have tonic and clonic convulsions with froth in the mouth. The blood pressure was 140/100 mm. of mercury. "Sodium luminal", 3 grains, was injected intramuscularly, and oxygen administered.

Bilateral episiotomy was performed, and a living female infant was delivered by breech extraction at 3.40 p.m. The convulsions continued, and morphine sulphate, 0·25 grain, was injected intramuscularly. At 3.45 p.m. the placenta was delivered, and then the episiotomy was repaired. Signs of pulmonary œdema became obvious. Atropine sulphate, 0·01 grain, and "Pentothal", 0·25 gramme, were injected intravenously.

At 3.50 p.m. respiration stopped, and despite efforts to resuscitate the patient by intubation with controlled respiration, "Coramine" given by intracardiac injection, and cardiac massage, the patient was pronounced dead at 4.20 p.m.

Post-Mortem Examination.

The significant findings arising from the autopsy were that there was some extravasated blood in the region of the right pudendal nerve with a through-and-through perforation of both walls of a moderate sized vein in this region. The chemical analysis of a sample of blood revealed 0·05 grain of "Xylocaine" in 180 ml. of blood, which showed that, after all the factors of distribution, excretion and metabolism are considered, a large amount of the original dose of "Xylocaine" entered the blood stream. How much entered directly into the punctured pudendal vein, or how much "Xylocaine" was absorbed from the highly vascular regions of the injections, is not the matter under discussion in this article, but the fact that such a rapid rise in the concentration of "Xylocaine" in the blood can occur from pudendal nerve block injections is important.

Discussion.

Other cases have been reported in which the toxic effects of "Xylocaine" were exhibited as drowsiness passing on to convulsions, after which some recovered while others ended fatally. In the previous cases, the results of blood analysis have not been reported to confirm the clinical observations, but in this case, owing to the fatal termination within a relatively short time of the injection, chemical analysis of the blood for "Xylocaine" was very helpful.

Apparently, many of those called upon to induce pudendal nerve block anæsthesia in obstretrics are not fully aware of why or whether 0·5%, 1% or 2% concentrations of "Xylocaine" solution should be used. Misleading factors in respect to this matter are that the usual, or most convenient, form of supply of "Xylocaine" is as a 2% solution, and the concept that "Xylocaine" is similar to procaine in regards to its toxicity.

Carnegie and Hewer (1950) state that, pharmacologically, "Xylocaine" is a relatively non-irritant analgesic substance of low relative toxicity with rapid onset and prolonged duration of action. In a concentration of 0·5% with adrenaline it produces almost as long an analgesia as 2% solutions without adrenaline.

Crawford (1953) states that "Xylocaine" should be used in smaller volume as well as in lower concentration than procaine because of its properties of diffusion, which result in a greater area being blocked, per unit, than with any other local anæsthetic drug. "Xylocaine" should be used in lower concentrates than procaine because of its greater activity and toxicity. "Xylocaine" should be used in half or less than half the concentrations of procaine. "Xylocaine" has equal toxicity to procaine at 0·5% or less, but as the concentration increases its toxicity exceeds that of procaine—at 1% it is 40% greater and at 2% it is 50% greater (with or without adrenaline).

Cox and Abramson (1952) state that toxic reactions, particularly from overdosage, occasionally occur. There may be irritation of the central nervous system accompanied by respiratory and circulatory collapse.

The use of barbiturates as antidotes if toxic signs and symptoms become evident, I think, could lead to a false sense of security, because in pudendal nerve block injection technique the "Xylocaine" might attain toxic levels in the blood very quickly, and if so, as in the case under discussion, the stage of medullary depression is reached quickly. The barbiturates are also medullary depressants.

Hence, the dangers of pudendal nerve block when "Xylocaine" is used having been clarified, this procedure may be described in the words of Hibbard and Grassie (1955):

> Pudendal nerve block is a near ideal anæsthetic for almost all forceps deliveries and for many cases involving manual rotation. The risks to mother and child are minimized and the particular risks of general anæsthesia eliminated. The technique is of particular value to the practitioner working single handed, who is often unable to obtain the services of an experienced anæsthetist.

Conclusion.

The purpose of this article is to demonstrate that: (i) with the volumes of local anæsthetic agent which may be used for pudendal nerve block anæsthesia, the toxic dose of "Xylocaine" is easily approached or reached; (ii) much of the injected local anæsthetic agent used in pudendal nerve blocks for obstetrical procedures may reach the blood-stream quickly, despite careful technique during the injection of the "Xylocaine" solution; (iii) dangerous toxic effects can be avoided without loss of the effectiveness of the local analgesia by limitation of the maximum dose of "Xylocaine" injected (less than 0·5 gramme), which is in practice the use of a maximum of about 70 to 80 ml. of a 0·5% "Xylocaine" solution.

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Addendum.

Since this article was written I have become aware of two other cases, in Sydney, in which the use of the 2% concentration of "Xylocaine" solution led to convulsions and finally death.

These were not obstetrical cases, but the same principle applied in relation to the unnecessary risk of injecting the more concentrated solutions (i.e. 2%) of "Xylocaine". In unpredictable cases the injected solution may find its way into the blood-stream very quickly, thereby reaching toxic blood concentrations which can prove to be fatal.

TWO UNUSUAL EYE CASES.

By ARTHUR D'OMBRAIN, F.R.A.C.S.,
Sydney.

THE following two cases are thought worthy of report: in the first, gross post-operative hæmorrhage was controlled by "Premarin"; and in the second, persistent corneal ulceration associated with congenital paresis of the orbicularis oculi was cured surgically.

CASE I.—Mrs. A., aged 52 years, had a perforating wound (from a broken drinking glass) of the left cornea, just inside the corneo-scleral limbus. There was a large prolapse of iris; there was no hyphæma. The apex of the prolapsed iris was grasped by iris forceps and pulled outwards some two or three millimetres, the prolapse then assuming the familiar pattern of a hollow triangle, with its base at the wound site. With de Wecker's iris scissors applied flat against the corneal wound site, each of the two sides of the prolapsed iris triangle were cut off flush with the corneal wound-site base. The anterior chamber immediately filled with blood, a happening familiar to all ophthalmic surgeons. The blood usually absorbs in a few days.

On inspection of the patient's eye the next day, I was confronted with the largest ocular secondary hæmorrhage I have seen. The subcutaneous hæmatoma was approximately the size of a tennis ball sliced in half. The patient was in great pain. An intravenous injection of 20 mg. of "Premarin" was administered. The next day the hæmatoma was reduced to about the size of a golf ball. The patient was no longer in pain. A second injection of 20 mg. of "Premarin" was administered intravenously, and the following day there was no subcutaneous hæmatoma to be seen, but the anterior chamber was filled with blood. A third intravenous injection of "Premarin" was given, and the next day the hyphæma had disappeared.

I had used "Premarin", an œstrogen manufactured by the firm of Ayerst Laboratories, with success in several cases of ocular hæmorrhage which would probably have resolved anyway, but in this case the magnitude of the hæmorrhage and the speed of its resolution make me think the case worth recording. I should like to thank Dr. Harvey Turk and Dr. William Hart, who kindly gave the intravenous injections for me.

CASE II.—Mr. B., aged 50 years, complained of sudden severe inflammation of his left eye. On examination, I found a most remarkable condition. I cannot find any mention of a similar lesion in the literature. There was bilateral congenital paralysis of the orbicularis muscles. From the day he was born, he has never closed his eyes; he cannot. There were two large pterygia; the presenting lesion was an extensive corneal ulceration in the left eye. I treated this with every medicament and by every method known to me, without success.

I believed that median tarsorraphy might be the answer, and Sir Norman Gregg, who kindly saw the patient for me, concurred. I sewed his lids together, by the classical technique, as carefully as I could; never before has this not very difficult operation failed in my hands. In this case it was a complete failure, as tension pulled the sutures out.

I then tried to effect a permanent partial closure of the palpebral aperture by operating in an area not affected by the paralysed orbicularis muscle. I used a modification of the Kuhnt-Dimmer technique for ectropion, excising a large vertical triangle of skin lateral to the external canthus, undermining the skin medially but not laterally (to avoid tension), and then suturing the gap together, thus pulling the lower lid outwards and narrowing the interpalpebral aperture to an extent that pulled the lower lid upwards enough to cover the ulcerated area of the cornea. The operation differed from the Kuhnt-Dimmer technique for cicatricial ectropion, in that the triangle of skin excised was placed well up above the level of the upper lid, so as to pull the lower lid far up. The operation proved successful. The corneal ulcer is healed, and the patient retains central vision.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Acta Leidensia: Edita Cura et Sumptibus: Scholæ Medicinæ Tropicæ", Volume 28, 1958. Universitaire Pers Leiden. 9¾" × 6", pp. 170, with many tables and figures. Price not stated.

Sixteen papers dealing mainly with tropical diseases.

"Personality Change and Development as Measured by the Projective Techniques", by Molly Harrower, Ph.D.; 1958. New York and London: Grune and Stratton, Incorporated. 10" × 6¾", pp. 390, with illustrations. Price: $10.00.

Based on the results of tests on some four thousand individuals over a period of fifteen years.

"Acetophenetidin: A Critical Bibliographic Review", by Paul K. Smith, Ph.D.; 1958. New York and London: Interscience Publishers. 9¼" × 5¾", pp. 192, with seven tables. Price: $5.75.

The fourth in a series of critical reviews of the literature on analgesic and sedative drugs.

"Progress in Clinical Psychology", edited by Daniel Brower, Ph.D., and Lawrence E. Abt, Ph.D.; Volume III, 1958. London and New York: Grune and Stratton, Incorporated. 9" × 5¾", pp. 256. Price: $7.75.

This volume "attempts a systematic and clinical look at the contemporary scene in clinical psychology, particularly during the past two years".

"Die Pränatalen Infektionen Des Menschen: Unter Besonderer Berücksichtigung von Pathogenese und Immunologie", by Dr. Heinz Fiamm, with a foreword by Professor Dr. Richard Bieling; 1959. Stuttgart: Georg Thieme Verlag. 9¼" × 6¼", pp. 150. Price: DM19.80.

"Atlas of Intracardiac Pressure Curves", by Professor Dr. Otto Bayer and Dr. Hans Helmut Wolter, with an introduction by Professor Dr. André Cournand; 1959. Stuttgart: Georg Thieme Verlag. 11" × 8", pp. 202, with 42 tables.

The authors hope that this atlas, by helping to prevent the misinterpreation of pressure readings, will increase the value of the method as an important tool of clinical diagnosis.

"Cardiovascular Sound in Health and Disease", by Victor A. McKusick, M.D.; 1958. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10¾" × 7¾", pp. 582, with 494 illustrations. Price: £8 5s.

Described as "a comprehensive treatise, introduced by a historical survey, illustrated mainly by sound spectrograms (spectral phonocardiograms) and supplemented by an extensive bibliography: with a section on respiratory sound".

"Tumors of the Lungs and Mediastinum", by B. M. Fried, M.D., F.C.C.P.; 1958. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9" × 5¾", pp. 468, with 231 illustrations. Price: £7 8s. 6d.

A full treatment of the subject with special attention to bronchogenic carcinoma.

"Reversible Renal Insufficiency: Diagnosis and Treatment", by Donald H. Atlas, M.D., Ph.D., F.A.C.P., and Peter Gaberman, M.D.; 1958. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 8¼" × 5¼", pp. 246, with 16 illustrations. Price: 77s.

An attempt to survey the whole field.

The Medical Journal of Australia

SATURDAY, APRIL 25, 1959.

THE METRIC SYSTEM IN MEDICINE.

THE decimal system for various forms of calculation is steadily gaining ground throughout the world despite a good deal of resistance, especially from Anglo-Saxon conservatism. Even such an everyday field as money is being more and more invaded, and a decimal system of coinage is reported to be receiving serious consideration in important circles in Australia. In most branches of science, the metric system of weights and measures has long been accepted to the exclusion of other systems. In the field of medicine, it has almost taken over in the laboratory; clinical practice and pharmacy lag behind, but there are signs of a major change even here. A strong factor influencing the change is the fact that most significant modern drugs are introduced with their dosage already in the metric system, and no one has thought it worth the mental effort required to translate this back into the imperial system; these drugs, increasingly dominating the field of therapeutics because of their potency and specificity, are pushing out many of the older drugs in their grains and minims. Equally important is the steady pressure being exerted by the Commission which compiles the British Pharmacopœia, under the ultimate direction of the General Medical Council. D. M. Dunlop and T. C. Denston[1] tell us that the gradual displacement of the imperial system of weights and measures by the metric system has proceeded throughout the history of the Pharmacopœia. The first edition referred only to the imperial system. In the second edition of 1867, solutions for volumetric analysis were defined in terms of British weights and measures and metrical weights and measures. In 1898 the metric system entirely replaced the imperial in all analytical procedures, and the formulæ for preparations were expressed in both systems. In the 1914 edition the statements on doses were given in both systems and the formulæ in the metric system only. In the 1953 edition the metric system alone was used throughout the appendices and monographs except in the expression of doses of substances commonly prescribed in the imperial system. For these latter the imperial dose was stated in parentheses after the metric dose. All the doses of the new drugs introduced in the 1958 edition are given in the metric system only, for these drugs have almost invariably been introduced into medicine and used in dosage terms based on the metric notation, and nothing would be gained by adding an equivalent imperial dose. The Council has approved the recommendation of its Commission that in the 1963 Pharmacopœia all reference to the imperial system should be entirely abolished.

The introduction of the metric system into clinical medicine in an exclusive role is obviously no light matter and rarely fails to provoke discussion when mentioned. Those who are interested in the pros and cons of the subject need go no further than the *British Medical Journal*. A lively and interesting correspondence has taken place in its columns on two occasions within the past fifteen years. The first ran for months in the second half of 1944, beginning with a letter of advocacy from Professor W. C. W. Nixon.[1] The second was started in 1953 by an article of which Professor Nixon was co-author with T. D. Whittet;[2] it was backed by a leading article in the same issue and provoked a string of letters for months afterwards. At the risk of over-simplification we may put the arguments for and against the introduction of the metric system in a few sentences. In favour of the metric system is the fact that it is simple and has found complete and continued acceptance in every other scientific sphere, whereas the imperial and allied systems are archaic and cumbersome. The main argument against the use of the metric system in medicine is that its adoption would be difficult and would lead to confusion—an argument which reflects neither adversely on the metric system nor favourably on the imperial and other traditional systems. Not the least of the disadvantages of the latter is the confusing conflict between the value of units of the same name in different systems—for example, the grain in the apothecaries' and avoirdupois systems. As the *British Medical Journal* well said[3] of these curious discrepancies:

> Such dangerous absurdities, as they have now become, have developed from modification of exceedingly antique methods of weighing various commodities such as precious metals and wool. But surely the time has come to relegate them to nursery rhymes, there to join those quaint, possibly Celtic, terms of enumeration now enshrined in the words "hickory, dickory, dock" and "eena, meena, mina, mo".

The idea of introducing the metric system into everyday medicine is of course not new in Australia. In 1945 we published an article by H. Finnemore,[4] in which he considered in a practical way how to deal with some of the difficulties that such a change would bring in prescribing and dispensing. The matter was discussed at a meeting of the Federal Council of the British Medical Association in 1950.[5] The discussion arose from a letter forwarded by the New South Wales Branch from the University of Sydney Medical Society, in which it was suggested that the metric system should be allowed as an alternative for prescribing and dispensing medicines. It was stated that the use of the metric system in New South Wales was illegal. The subsequent discussion revealed that this extraordinary position did not obtain in all other States, but nothing positive was

[1] *Brit. med. J.*, 1958, 2:1252 (November 22).

[1] *Ibid.*, 1944, 2:320 (September 12).
[2] *Ibid.*, 1953, 1:327 (February 7).
[3] *Ibid.*, 1953, 1:320 (February 7).
[4] MED. J. AUST., 1945, 2:431 (December 15).
[5] *Ibid.*, 1950, 1:246 (February 18).

done about the matter. So far as we know this legal obstacle still exists, although it appears to be due to no more than the absence of standard metric weights and official inertia in the matter of amending the relevant legislation. By far the most constructive action yet taken is that of the Royal Melbourne Hospital, which on May 1, 1958, after considerable investigation, introduced the metric system of weights and measures throughout the wards and medical departments of the hospital. In addition the Centigrade system of temperature measurement was adopted. The steps involved in this and the background of information on the subject are set out elsewhere in this issue in an article by P. N. O'Donnell and B. Ungar (see page 553). The Royal Melbourne Hospital is to be congratulated on this pioneer move amongst hospitals and on demonstrating to doubters that the practical difficulties are not insuperable. We sincerely hope that their action will set up a chain reaction. Indeed, it has already started in Victoria with the blessing of the Hospitals and Charities Commission. The Commission[1] believes that a gradual change over to the metric system should be adopted by all hospitals and has expressed the hope that this matter will receive the consideration of all hospital boards and their medical staffs. Of other Melbourne hospitals, the Royal Children's Hospital introduced the system on February 1, 1959, and the Queen Victoria Hospital is to make the change in May, 1959. The Alfred Hospital and St. Vincent's Hospital have been carrying out trials of the system, and other hospitals are considering the matter. In New South Wales, we understand that the subject has received a great deal of thought, and in at least two major hospitals, the Royal Prince Alfred Hospital and Sydney Hospital, the honorary medical staff has recommended to the Board that the change be made. The serious difficulty here, which surely could be overcome with a little persistence, is the legal one to which we have already referred. The N.S.W. Hospitals Commission is of the opinion that a change-over should be on a State-wide basis, and it would certainly have to take into account the question of the training of nurses, including those who are in practice. For the medical profession it should offer no real difficulties. In Queensland the subcommittee revising the Hospital Pharmacopœia of the Brisbane and South Coast Hospitals Board has considered the question and agrees that a change is desirable, with the qualification that a sudden change may lead to confusion. As a compromise it has been recommended that doses be expressed in the metric system first, with approximate equivalents in the present system as well. If this recommendation to the subcommittee is accepted by the full advisory committee on drugs and surgical appliances, it will be brought in with the next edition of the Hospital Pharmacopœia. In South Australia, it appears that the matter is receiving preliminary thought at the Royal Adelaide Hospital, and a move may well be made within the next year or two to effect a change. Elsewhere in the State no change appears to be envisaged, other than at the new Queen Elizabeth Hospital, which, we understand, is starting off on the right foot with use of the metric system from the outset. So far as we can learn, the matter has not been seriously considered in Western Australia or Tasmania. To sum up, it appears that there is little or no active opposition to the metric system in hospitals, at any rate from the medical staff, and no doubt its introduction into institutional practice will lead to its general use in medical practice. There is fairly general agreement, even if it is a little vague at times, that the use of the metric system would be a good thing. It would be foolish to play down the practical difficulties involved in its adoption, but they are not insuperable, as has been demonstrated, and should not be allowed to decide the issue. Perhaps the matter will be finally solved by the Commonwealth legislation to which O'Donnell and Ungar refer.

[1] *Your Hospitals*, November, 1958.

Current Comment.

PULMONARY EMBOLECTOMY.

It is a commonplace that in medicine as in other matters certain procedures or forms of therapy may enjoy a vogue, then suffer eclipse, often to be revived again at some later date. It is often instructive to consider the reasons for these changes in favour. In a recent paper from the Harvard Medical School, R. W. Steenburg and his colleagues[1] have considered the use of pulmonary embolectomy in the light of a successful embolectomy performed at the Peter Bent Brigham Hospital. They point out that in the years between 1920 and 1940 the subject was much discussed in medical literature, with reports of many unsuccessful and a few successful cases. The operation was first proposed in 1908 by Trendelenburg, who demonstrated the feasibility of the procedure; but Kirschner, in 1924, has the distinction of having performed the first pulmonary embolectomy to be followed by permanent recovery, and this success was followed by a considerable vogue for the procedure both in Europe and in America. However, after 1940 the operation fell into disuse, and Steenburg and his colleagues state that the European medical literature has been the sole source of any reference to pulmonary embolectomy for about two decades. In discussing the reasons for the abandonment of the procedure, they give as the first the discouragement arising from many unsuccessful attempts. They list all the recorded cases of the successful removal of massive pulmonary emboli which they could find; all but two of these operations were performed before 1940, and they state that prior to their own case there had been no successful pulmonary embolectomy reported in the United States. Between 1933 and 1943 the operation had been performed 14 times at their own hospital, but all the patients had died, the longest survival being for two hours. The other important reason was the introduction of anticoagulant drugs, which gave promise of a more basic attack on thrombo-embolic disease, and which moved Ochsner to say that the operation for the removal of pulmonary emboli was one "which should be of historic interest only". However, the hopes raised by these new drugs have not been altogether fulfilled, and Steenburg and his colleagues note that at their hospital about five cases of major massive pulmonary embolism still occur each year, in an annual total of 2500 surgical operations; even in centres where anticoagulants are extensively used as a prophylactic measure, the accident has not been eliminated. In their own case the patient was a female, aged 64 years, who suffered a massive pulmonary embolism on the sixth day after an operation for cholecystectomy. The time was 3.30 p.m.; the necessary personnel were at hand; the operating theatre was open and was on the same floor as the ward in which the patient lay. An immediate electrocardiogram was taken, and operation was begun 45 minutes after the seizure had occurred. Ten minutes later two

[1] *Surg. Gynec. Obstet.*, 1958, 107: 214 (August).

large clots were removed from the right main pulmonary artery. Though the patient was cyanotic and gasping, and the blood pressure had been unobtainable for 25 minutes before the start of the operation, she was still breathing, and Steenburg and his colleagues admit that she might have survived without operation. However, they refer to a reported case in which a surgical team stood by, ready to operate, for 17 hours till it was obvious that the patient would not survive without operation, only to have the patient die as the operation was begun, and they very reasonably urge that with modern resources such an expectant attitude is no longer admissible. As they point out, it does indeed seem remarkable that the enormous advances in intrathoracic surgery within the last 20 years have not already led to a revival of the operation of pulmonary embolectomy. Conditions today are immensely more favourable for the survival of the patient than they were when the operation went into eclipse at the beginning of the last decade. Steenburg and his colleagues have reviewed the reports of earlier operations at their hospital and conclude that, with modern techniques, four out of seven patients whose hearts were still beating at the time of thoracotomy would have survived today; they consider that in 20% to 30% of cases of massive pulmonary embolism the criteria which should make possible successful pulmonary embolectomy are fulfilled, and that on an average about one case of massive pulmonary embolism in which it should be possible to cure the patient by immediate surgical intervention occurs at their hospital each year. The importance of immediate diagnosis is obvious, and they consider that the three diagnostic points of cardinal importance are the finding of distended neck veins, the electrocardiographic finding of acute cor pulmonale, and the elimination of other diagnoses, among which they mention myocardial failure, massive sepsis, hæmorrhage and acute electrolytic imbalance. Finally they suggest various technical modifications of the classical procedure, in the light of recent developments in surgical technique and of their own experience.

DIRECT SURGERY FOR CORONARY ARTERY DISEASE.

ONE of the remarkable advances of the century has been the successful entry of the surgeon into the field of cardiology. Initially the surgeon's interest was confined to traumatic heart disease and constrictive pericarditis, but during the last 20 years we have witnessed the dramatic progress in the treatment of congenital defects and acquired valvular heart disease. In the field of coronary artery disease and myocardial infarction, however, attempts at surgical treatment had so far been limited to palliative cervico-dorsal sympathectomy, an operation of definite but limited value, and some pioneering attempts by various authors to increase blood flow to the myocardium. Although many variations have been described by C. S. Beck and others, such as grafting of pectoral muscle or omentum onto the pericardium, pericardial abrasions, direct implantation of the internal mammary artery and ligation of the same artery, none of these procedures has won universal acceptance, mainly because conclusive evidence of their therapeutic benefit has never been established. With improvements in vascular surgery more direct attacks on the occluded coronary blood vessels have been attempted. The Mayo Clinic group, N. H. Baker, G. H. Grindlay, J. W. Kirklin and J. E. Edwards,[1] reported an experimental study at the Thirty-first Scientific Session of the American Heart Association in October, 1958. They were encouraged by the finding that nearly 70% of occlusions in the major coronary arteries occurred in the proximal 4 cm., and that at that site the average outside diameter of the coronary artery was 4·2 mm., a size which experiments on dogs had shown to be large enough for autogenous arterial grafting or direct internal mammary-coronary artery anastomosis.

An important and exciting advance in treatment has recently been reported by W. P. Longmire, J. A. Cannon and A. A. Kattus,[1] with direct vision coronary endarterectomy in five patients with angina pectoris. The operation was devised on the basis of four premises: that the patient with severe angina pectoris is likely to have complete occlusion of at least one of the three major coronary branches; that the occlusive process is likely to be located near the aortic origins of these vessels; that the distal coronary tree beyond the occlusion is likely to be patent and supplied with blood through collateral anastomotic channels; and that it is technically possible to perform endarterectomy on vessels the size of the human coronary arteries. The patients selected for coronary endarterectomy had pain of such severity as to render them incapable of gainful employment. The patients were all relatively young, the oldest being aged 53 years, and none had definite evidence of recent or remote myocardial infarction. Although they discussed the possibility of pre-operative coronary angiography, Longmire and his colleagues in the present series made no attempt to assess the pathological anatomy of the coronary tree before operation. They relied instead on direct inspection of the main coronary branches during thoracotomy and assessment, by palpation, of the patency of the peripheral vessels. One of their methods was to occlude gently the coronary artery in question for a period of three to six minutes whilst observing the colour of the myocardium supplied by this artery and also the electrocardiographic changes during the period of occlusion. If no changes were noted, the vessel was not supplying blood to the myocardium and could be assumed to be completely occluded. Special instruments have been devised for adequate coronary endarterectomy, and of course particular attention was given to the suturing of the incision in the coronary artery.

Four of the five patients survived the operation; in one patient fatal asystole occurred. In the immediate post-operative period two of the four survivors were completely relieved of their pain, and in the other two patients the frequency and intensity of the anginal attacks were greatly reduced. These subjective improvements were accompanied by marked amelioration in the electrocardiographic tracings taken during exercise after operation.

It is of course much too soon to say whether an operation such as that described by Longmire and his colleagues will lead to lasting improvement. After all, in spite of the patchy nature of the atheromatous process, the underlying condition is due to a generalized disorder, be this of metabolic or degenerative origin. Nevertheless, Longmire and his colleagues are to be congratulated on having established that it is technically feasible to reestablish blood flow in obstructed major coronary arteries. Further reports with additional cases and longer periods of observation after operation will be awaited with great interest by physicians and laymen alike.

[1] *Circulation*, 1958, 18: 690.

[1] *New Engl. J. Med.*, 1958, 259: 993.

HIGHLY POLISHED FLOORS IN CONSULTING ROOMS.

THE following notice, published in the *B.M.A. (Victorian Branch) Monthly Paper*, March, 1959, at the request of the British Medical Insurance Company, may be of general interest:

> Within the last few months the Company has had several public risk claims when patients in stockinged feet have stepped from examination couches and slipped on highly polished floors. Injuries including fractures have resulted and the Insurance Company suggests a rubber mat being placed on the floor or some other precaution being taken to prevent the occurrence of this type of accident.

No comment is necessary beyond remarking that there is no reason to think that floors in Victoria are more slippery than those elsewhere.

Abstracts from Medical Literature.

OBSTETRICS AND GYNÆCOLOGY.

Dystocia and Occipito-Posterior Position.

L. R. Weekes and K. G. Hobbs (*Amer. J. Obstet. Gynec.*, December, 1958) discuss delayed labour and the occipito-posterior position. They state that patients should be screened for possible dystocia on the first antepartum visit. It is in the android and the anthropoid pelves that the incidence of occipito-posterior positions is high. X-ray pelvimetry should be used when contracted pelvis is suspected. Spontaneous rotation occurs in the majority of cases, but the second stage is often prolonged and in one third of the cases rotation does not take place until the vertex reaches the pelvic floor. In about 5% of cases rotation does not occur and a persistent occipito-posterior position results. The authors recommend awaiting spontaneous rotation, but if this does not occur at the end of two hours in the second stage of labour, they recommend an attempt at manual rotation and forceps delivery. If this fails an attempt at forceps rotation should be made, and if this is unsuccessful Cæsarean section should be undertaken before serious damage is done to mother or fœtus. Of the authors' series of 1120 collected cases, in 284 delivery was by Cæsarean section, in 290 by forceps application in the occipito-posterior position, in 192 by manual rotation, in 166 by forceps rotation, in 55 the fœtus underwent spontaneous rotation, and in 133 spontaneous delivery was effected in the occipito-posterior position.

Diverticulum of the Female Urethra.

J. E. Nicol and N. M. Guiou (*Canad. med. Ass. J.*, October 15, 1958) review eleven cases of diverticulum of the female urethra from the records of the Ottawa Civic Hospital in 23 years. They state that the condition is in many cases overlooked, and that it is doubtful whether the condition is ever congenital, as it is very rarely found in children or in the nulliparous, and is usually associated with a pregnancy or an obstetrical injury. In the authors' series all the patients were married and all but one had had children. The presenting symptoms include frequency of voiding, sometimes with stress incontinence due to the accompanying cysto-urethrocele, difficulty in voiding, pain on urination, painful intercourse, or a swelling in the vagina. On examination there may be tumefaction in the suburethral tissues and sometimes a definite cystic mass may be made out, which may be either quite small or large enough to extend to the anterior fornix. Pressure on the mass may, if its urethral opening is adequate, cause purulent or cloudy fluid to escape from the meatus. However, the sole physical finding may be tenderness in the neighbourhood of the urethra. Urethrography is a valuable diagnostic aid. The classical treatment is surgical removal, the earlier the easier. The authors state that Edwards and Beebe recommend splitting the urethra to the opening of the diverticulum, and that as an alternative to a difficult dissection, Ellik advises an improved version of the simpler method of incision and packing.

Injuries to the Sacral Plexus in Obstetrics.

W. G. Whittaker (*Canad. med. Ass. J.*, October 15, 1958) discusses injuries to the sacral plexus in obstetrics. He states that the incidence of this complication of labour is low, and reviews 14 cases occurring in Toronto during the previous five years. It is estimated that the incidence of cases in which paralysis and sensory disturbances are clinically recognized in the puerperium is about one in 5000 deliveries. Obstetric palsies may occur in cases of disproportion, prolonged labour and difficult delivery, and instrumentation. The author presents a series of 14 cases, of which the injury resulted from mid-forceps operation in 10 cases; in eight of these cases forceps were applied for transverse arrest. One injury occurred after Cæsarean section. Clinical symptoms usually appear immediately after delivery, and weakness of a leg was the major complaint. A sense of numbness, tingling, or pain in the foot and leg was present in some form in 85% of cases. Numbness was usually felt in the lateral aspect of the leg and dorsum of the foot. Impairment of sensation to prick and light touch was present in 70% of cases. Weakness or paralysis of the tibialis anterior muscle was a constant feature and is characteristic of injury to the fourth and fifth lumbar nerve roots. The long extensors of the toes and the peroneal muscles were involved in some of the more severe cases. In only one case was there weakness of the thigh muscles. The bony pelvis in these cases was considered adequate for a baby of average weight, but the author regards a long posterior ilium and a prominent sacro-iliac joint as features predisposing to injury of the lumbo-sacral trunk by a large fœtal head or the obstetric forceps. The high incidence of difficult mid-forceps operations among these cases suggests injury to nerve roots by the obstetric forceps. The lower edge of the anterior blade rolls over the lumbo-sacral trunk as the forceps crosses the sacro-iliac joint while being swept over the fœtal face. Manual rotation is also implicated but the flatter back of the hand produces less trauma than the sharp blade of the forceps. Treatment in the main is expectant and directed towards rest of the part and prevention of contraction deformities in the recovery period. The author recommends sedation, a foot-board, sandbags and night splints, and on discharge from hospital the use of a walking plaster or spring drop-foot splint. Return of normal sensory function was usually complete within four weeks, and occasionally improvement began before the patient's discharge from hospital. Motor function was the last to return, but there was complete recovery in most cases within a maximum period of twelve weeks. At the end of six weeks the foot-drop splint was generally no longer required. Muscle paralysis may be permanent, but improvement may be expected over a period as long as two years in those cases where recovery is delayed for more than three months. The author advises that in subsequent pregnancies repetition of the causal factors should be avoided, and Cæsarean section should be considered unless labour is satisfactory and easy delivery from below anticipated.

Œstrogens in Abnormal Pregnancy.

H. Pigeaud, R. Béthoux and P. Burthiault (*Presse méd.*, December 17, 1959) have studied the urinary excretion of œstrogenic substances in a number of normal and abnormal pregnancies, and as a result have estimated the ratio $\frac{\text{œstrone—œstradiol}}{\text{œstriol}}$ and studied its variations. They have called this ratio, which makes it possible to estimate œstrogen metabolism, the coefficient of utilization of œstrogens. To simplify the matter, the results are expressed in percentages, so that $K = \frac{OD}{T} \times 100$, where K is the coefficient of utilization of œstrogens, OD is the œstrone-œstradiol fraction and T represents the œstriol fraction. The authors state that this ratio, which is relatively high during the first months of pregnancy, generally remains below 10 from the fifth month of normal pregnancies. A progressive increase in the ratio during the course of abnormal pregnancies (threatened abortion and disorders of the last trimester) is of bad prognostic import, and seems to indicate fairly exactly the extent to which the fœtus is being affected. They state that reduction of the ratio resulting from active hormonal treatment proves that the chorion of the fœtus is capable of metabolizing œstrogens, so that study of the coefficient of utilization of œstrogens, which permits control of treatment, seems to represent a real step forward in the sphere of endocrinology of pregnancy.

Halothane in Obstetrics.

M. P. Embrey, W. J. Garrett and D. L. Pryer (*Lancet*, November 22, 1958), having been impressed, when performing external version, by the degree of relaxation of the uterus apparently afforded by halothane ("Fluothane") anæsthesia, undertook a tocographic investigation of the effect of halothane on the contractility of the uterus. They obtained records from 12 patients, and in 11 of these inhibition of spontaneous uterine contractions was demonstrated. In the twelfth case oxytocin was being administered by intravenous infusion for surgical induction, and in this case too the contractions were inhibited. The inhibitory effect was rapidly produced at a relatively light plane of anæsthesia, and quickly disappeared when consciousness was recovered. The authors found that induction of anæsthesia was easy, rapid and very rarely attended by excitement, and in every case consciousness was recovered within a few minutes. Atropine was the only premedication given, and no marked slowing of the pulse was noted. No patient became cyanosed. The authors state that they do not intend to recommend the widespread use of halothane in obstetrics, but that an anæsthetic agent which relaxes the uterus so effectively, and which does not appear

to have the dangers of chloroform or the unpleasant sequelæ of deep ether anæsthesia may find a place in circumstances where uterine relaxation is essential.

Carcinoma of the Cervix.

B. McLEAN, F. C. TALBOT AND W. JEND, JUNIOR (*A.M.A. Arch. industr. Hlth*, September, 1958) report the result of an attempt to screen for uterine cancer the female employees of the Michigan Bell Telephone Company, which employs 15,000 women. This was done by inviting employees to submit self-collected vaginal smears for cytological examination. Smears were obtained by the use of tampons, under the supervision of visiting nurses. During the first five months of the project, smears were examined from 2445 employees. In 44 cases the smears were abnormal, and in five the presence of previously unsuspected carcinoma-in-situ or invasive carcinoma was confirmed. In three of these five cases, the patient was under 30 years of age. The authors conclude that the test is acceptable, practical and effective. They state that the procedure adopted is as effective as the taking of direct smears, and that it can be administered with a minimum of lost time and a minimum of professional supervision and help. They consider that other industrial groups may be encouraged to investigate the possibility of offering this test to their female employees.

PÆDIATRICS.

Psychogenic Megacolon.

P. PINKERTON (*Arch. Dis. Child.*, August, 1958) discusses the development and management of functional megacolon of psychogenic origin. Functional megacolon must be clearly distinguished from true neurogenic or aganglionic megacolon. The study included 30 children, referred for the most part by pædiatricians and pædiatric surgeons, collected over a three years' period. Investigation had shown no organic basis for the condition and the children were referred for psychiatric opinion either because of unsatisfactory response to standard treatment or because the condition was suspected of having a psychological basis. These children were compared with a group of 21 children whose constipation had been shown to have no organic basis and who had responded satisfactorily to non-psychiatric treatment without relapse. Four significant differences were found in the emotional state of these two groups. There were parental personality characterized by excessive rigidity and/or anxiety in 93% of the study group and in none of the control groups; parental fears and prejudices relating to constipation in 73% of the study group and 5% of the controls; parental over-valuation of the child in 60% and 10% respectively; a history of primary coercive toilet training in 57% of the study group and in none of the controls. Therapy had to be aimed at both parents and children. It was important for the parents first to accept the psychogenic basis of the complaint and to have their fears about the grave consequences of constipation set at ease. For this purpose a joint consultation with a pædiatric physician was a great help. Group therapy proved of real value in getting the parents to reveal and correct their attitudes and prejudices about their children's complaint. Group leaders were chosen from the mothers who had achieved the greatest depth of insight, who accepted the psychiatric viewpoint enthusiastically, and who had the ability to disseminate the principles they had themselves absorbed. Group meetings were held each week, the psychiatrist doing no more than unobtrusively supervising and guiding the discussion. For treatment of the child, hospital admission was occasionally necessary to protect him temporarily from carping parental pressure or excessive domination. Play therapy was used to penetrate the child's defence, to reveal his fundamental problem for him and to help work through his difficulties by releasing pent-up hostility during play. The children portrayed their fantasies by modelling in sand and by free-hand drawing on paper. They were asked to draw something particularly disliked, and in many cases the drawings were of diagnostic importance. Children being given enemata were drawn repeatedly. Hostility was dispelled by the children's being allowed to bombard and destroy these drawings.

Methylpentynol Carbamate in Pædiatrics.

J. WEILL, MME. BERNFELD AND MME. ROSENBLUM (*Presse méd.*, August 16 and 23, 1958) have carried out an investigation of methylpentynol carbamate in pædiatrics. The clinical material consisted of children aged from two to 16 years, classified in the following four groups: (i) normal controls; (ii) children suffering from a diencephalic disorder of indisputably psychotic origin; (iii) children suffering from endocrine conditions with no hypothalamic basis, who were referred with behaviour disorders; (iv) children in hospital, making an unsatisfactory adaptation to hospital conditions and separation from their families. The authors state the following conclusions: Methylpentynol carbamate was well tolerated by all the children. Satisfactory dosage is not related either to age or to weight; it is almost the same as for adults, but depends in part on the pathological condition and must be found by trial and error; the effective dosage, once determined, does not always remain the same. No clouding of consciousness and no hypnotic effect were noted even with large doses. The action of the drug on the behaviour, nature and temper of children whose condition had no apparent neurotic or psychotic basis was clear-cut, and seemed to persist after the treatment had finished; the effect was not so great on children whose disorders were related to an unsatisfactory family atmosphere or to a permanent sense of insecurity; it was inconstant in neurotic patients. The drug appears to have no action on cortico-diencephalic function; it does not relieve vegetative, metabolic, endocrine or somatic disorders following an emotional upset. The authors state that in their opinion the indications for the use of methylpentynol carbamate in the treatment of children are as follows: (i) for children making a bad adaptation to hospital conditions or to separation from their families; (ii) for sick children undergoing repeated examinations or painful treatments which produce anxiety; (iii) occasionally for behaviour disturbances associated with particular events or an exaggerated emotional attitude interfering with satisfactory progress at school; (iv) for disordered behaviour due to a disturbed family situation or a difficult social situation, without any psychotic background.

Sweat Electrolytes in Allergic Disease.

DAVID YI-YUNG HSIA *et alii* (*Amer. J. Dis. Child.*, December, 1958) have investigated the electrolyte content of the sweat of a series of patients suffering from various allergic diseases. An elevation of both sodium and chloride was found, the main sodium level being $45 \cdot 4 \pm 4 \cdot 2$ m.Eq/l. and the chloride figures, $28 \cdot 6 \pm 3 \cdot 3$ m.Eq/l. These figures are distinctly higher than normal but much lower than the figure usually found in fibrocystic disease of the pancreas. A *questionnaire* sent out to families of patients with allergic disease did not show any increased incidence of fibrocystic disease. The abnormality of sweat electrolytes did not seem to be related to age, sex, race, type of allergy or medication used by the patient. The significance of the findings in terms of the genetics of fibrocytic disease and the possible genetics of abnormal sweat electrolytes is discussed. It seems that four groups of persons may show abnormalities of sweat sodium and chloride: (i) the patient with fibrocystic disease of the pancreas, (ii) the carrier of the gene for this disease within his immediate family, (iii) presumed carriers of the gene in the general population, and (iv) some patients with allergic diseases.

The Children of Older Mothers.

J. A. BÖÖK *et alii* (*Nature*, May 31, 1958) have analysed the outcome of 70,962 births in Sweden during the decade 1946–55 to determine the effect of parental age on the incidence of congenital malformations. They state that parental age has a special relevance to the question of gene mutation induced by ionizing radiation. Since some congenital malformations are due to fresh mutations, it may be anticipated that the accumulated doses which have been received by older individuals cause a higher incidence of such conditions in their offspring. In the total analysed there were 1030 mothers over 42 years of age. One triple and nine twin births brought the total number of offspring to 1041. The high incidence of mongolism was outstanding. There were 22 mongoloid children, an incidence 45 times that for mothers of all ages. The incidence of anencephaly (2 cases) did not differ significantly from that in the general population, but in all other groups the incidence of malformations was significantly higher among the children of the older mothers; malformations of the gastro-intestinal tract and of the cardio-vascular system were in each case about six times more frequent in the latter group.

Congresses.

THIRD WORLD CONGRESS OF CARDIOLOGY.

THE Third World Congress of Cardiology was held at Brussels, Belgium, on September 14 to 21, 1958. The President was Professor P. Rylandt, and the Secretary was Dr. Van Dooren. Registration was effected at the Free University of Brussels, and every member of Congress received, in addition to the usual maps, social invitations and programme details, a complete résumé in French and English of the scientific proceedings of the Congress. Free admission to the World Fair and maps of the Exposition were provided for each registrant.

The opening ceremony of the Congress was held in the *Musée des Beaux Arts* in the presence of the King and Queen of the Belgians, and Professor P. Rylandt delivered the presidential address. Flags of all member nations formed a half-circle behind a distinguished assembly of delegates and representatives. In the evening a reception by the Burgomaster at the beautiful seventeenth century Town Hall provided a memorable scene.

The scientific programme was extremely large and spread over nine auditoria, so that at best even the most conscientious member of the Congress could hear only a fraction of the communications. The principal symposia were held in a magnificent new amphitheatre seating about 800, with excellent acoustics and most satisfactory simultaneous translation; but a number of the smaller theatres lacked such facilities and were rather remote from the centre of operations.

The prior grouping and arrangement of the hundreds of separate communications offered at a World Conference is a most difficult task for the organizers, but twelve "round table conferences" were arranged, each lasting about two hours. The titles of these were as follows: (i) surgery of congenital heart disease; (ii) surgery of acquired heart disease; (iii) cor pulmonale; (iv) myocardial insufficiency; (v) angina pectoris and myocardial infarction; (vi) acute rheumatism; (vii) clinical significance of minor alterations in the electrocardiogram; (viii) subacute bacterial endocarditis; (ix) peripheral vascular disease; (x) phonocardiography; (xi) angio-cardiography; (xii) pulmonary function in mitral stenosis.

The 21 symposia concerned themselves with more academic considerations, but sometimes overlapped the material presented at the round table conferences. Five or six speakers contributed to each symposium. Representative titles were "cardiac electrophysiology", "mechanism of the heart beat", "adaptation of the heart to environment", "coronary circulation", "pulmonary circulation", "hypertension", "radiology" and "vectorcardiography", while "epidemiology" and "social cardiology" formed a special sub-group. The hundreds of individual communications, related or miscellaneous, which constituted the remainder of the programme would require a special monograph for their description. The only way in which one can even attempt to transmit any new or important information is to make a brief selection of material under a few arbitrary headings.

Cardiac Surgery.

The first of these is naturally cardiac surgery, as this exciting chapter in therapy is advancing rapidly, and the symposium attracted the largest audiences. It was well arranged, and many of the world's most prominent cardiac surgeons participated. Harken (U.S.A.), for instance, was enthusiastic about the results of operations in congenital aortic stenosis under vision through a sleeve or tunnel of ivalon sewn into the aorta, or by the aid of an extracorporeal circulation, in each instance with simultaneous coronary perfusion. A partial by-pass, whereby the left auricular blood is transported to the femoral artery, has also been used. Hypothermia is badly tolerated, and he held that no place existed nowadays for the blind transventricular approach to the valve. Glover (U.S.A.) did not agree that dilatation of the valve from below was obsolete. Harken reported a mortality rate of 15%, Glover 21%. Harken stated that no evidence of re-stenosis had been observed in an eighteen-month follow-up, and that 70% of his patients were back at work. He made a strong plea for operation before the advent of auricular fibrillation or progressive dyspnœa. Bailey (U.S.A.) pointed out the necessity to distinguish between disease of the valve cusps and narrowing of the valve ring. In the former, an attempt to excise calcified masses and to restore mobility to the valve edge under vision was more rewarding than stretching with a metal dilator. In such an operation requiring great care and delicacy, he stated that his method of using the patient's lungs instead of an artificial oxygenator was safer and equally effective.

Bailey also described several operations for the relief of aortic incompetence. He said that sometimes careful "modelling" of the cusps allowed them to lengthen. For patients with considerable enlargement of the aortic ring, he had completely excised the non-coronary leaflet and at the same time narrowed the whole opening by a purse-string suture, or longitudinal excision of part of the aortic wall. Lillehei (U.S.A.) stated his belief that aortic stenosis, aortic incompetence, mitral stenosis and mitral incompetence should nowadays all be managed by the open by-pass method. The operation for mitral incompetence involves correcting the herniation of the whole valve apparatus into the left auricle. Sewing together the distal angles of the cusps and placing an ivalon baffle on the more mobile half of the valve, so that it will help to cover the valve gap during systole, was one common technique. The operation is still in its infancy, and no significant large series are yet available. The successes, while not abundant, have been very satisfactory, with considerable shrinkage in heart size.

The technique of left heart catheterization has established itself in all larger centres. Reliable pressure readings from the left auricle, left ventricle and aorta are readily obtained by experts by the transbronchial approach or by chest puncture through the chest wall. Needling from behind is now less popular and not much in use. The results are more valuable in the assessment of aortic stenosis than in mitral disease.

There is no competition between hypothermia and the extracorporeal circulation from the point of view of cardiac surgery. As the safety and efficiency of the latter improve, hypothermia is used less frequently. Only procedures which can be completed in less than 12 minutes' double arrest are suitable for hypothermia. Possibly more profound grades of hypothermia may become practicable which will lessen this limitation. H. Swan (U.S.A.), whose experience with hypothermia is greater than most, stated that his group did not allow the rectal temperature to fall below 30° to 32° C. He said that after external body cooling, deliberate respiratory alkalosis was maintained by hyperventilation throughout the whole period of induction of anæsthesia and recovery, and a constant drip administration of 5% to 10% dextrose solution was maintained at 30 to 40 drops per minute. The patient was carefully positioned so that the cardiotomy would be at the most superior part of the heart. At the onset of circulatory occlusion, the heart was slowed by the injection of 1:4000 neostigmine solution into the coronary circulation after the root of the aorta had been clamped. The period of circulatory occlusion should not exceed six minutes. If the operation could not be completed in that time, the operator must retreat from the heart temporarily, closing the cardiotomy and restoring the whole circulation for 10 to 15 minutes. After that a further six minutes were available to complete the intracardiac objective.

Swan insists on having fresh heparinized blood available for the first part of a transfusion, and the administration of anticoagulants is continued during the convalescence of patients who have had a dilated pulmonary vascular bed, but in whom the flow is now greatly reduced—e.g., those with atrial septal defect. Heating is effected by internal diathermy. Swan stated that in his last 41 operations for pulmonary stenosis, and his last 53 operations for atrial septal defect, he had not had a single death. Some of the main problems in the extracorporeal circulation have been through blood oxygenation and blood procurement. Not much was said at Brussels about the various forms of artificial heart now available, as these machines are relatively new to Europe as compared to America; but it is apparent that the bubble oxygenator of the original Lillehei de Wall models will be replaced by screen oxygenation or rotating disk or membrane oxygenation of the Melrose or Kay-Cross types. The problem of blood procurement seems less acute in the densely populated cities of Europe or U.S.A. than in Australia. Chemical arrest of the heart is a great surgical boon, and a number of speakers discussed their own techniques of cardioplegia, using either potassium or acetylcholine; but the limits of safety of this manœuvre need further study. As Swan said, "the flaccid heart displays well its anatomy, but poorly its function", and sometimes, as in the repair of mitral incompetence, it is necessary to watch the functional results of each suture before proceeding further.

The operation for aortic incompetence, which created much interest at the second International World Congress in Washington, was not mentioned again; but an operation whereby the aortic cusp which does not underlie

a coronary ostium is removed in its entirety, together with an associated longitudinal segment of the aortic wall, was advocated by Bailey (U.S.A.).

Less attention was paid during this Congress to surgery of the mitral valve, and it was obviously not the general experience that large numbers of patients required a second valvotomy. It was also evident that cardiac catheterization is not now required in every case before a decision to operate is made. The symptomless patient with a high pulmonary artery pressure should accept operation within a reasonable period. Predominant aortic stenosis can be treated at the same time as mitral stenosis; but in obvious aortic incompetence, operation on a stenosed mitral valve alone is undesirable. Valvotomy can now be undertaken at any moment after the third or fourth month of pregnancy, and termination of pregnancy should now be considered only as a last resort. However, in most cases, careful observation and cooperation on the part of the patient allow a satisfactory outcome, and valvotomy can be undertaken later.

The main question now in mitral valve surgery is that of longevity. While it is certain that life after a successful operation is more comfortable and active, it is not certain whether a significant prolongation of useful activity is always achieved. L. B. Ellis (U.S.A.) reported a follow-up investigation of 1000 patients for one to eight years after valvoplasty. He reported improved survival figures in comparison with patients who had not been operated upon—namely, 81% of Group III patients and 59% of Group IV patients were obviously improved. Patients in normal rhythm did better than those with auricular fibrillation, and patients left with moderate or marked regurgitation fared less well. Age, sex, pre-operation valve size, occurrence of the post-commissurotomy syndrome, evidence of rheumatic "activity" such as the presence of Aschoff bodies in the atrial biopsy specimen and myalgia or arthalgia had no effect in the late results. Remarkable reduction in operative mortality points to another important factor in progress—namely, the experienced surgeon, and also his ability to obtain adequate dilatation with safety. The use of a dilator introduced into the mitral valve through the left ventricular wall has been of great assistance in the "tough" cases.

In the field of congenital heart disease, blind operations have been replaced by deliberate incisions made under vision, and the most successful of these is that of pulmonary valvotomy for simple pulmonary stenosis, and the direct closure of atrial septal defects. A mortality rate of under 2% for selected patients who are proven by cardiac catheterization or dye-dilution techniques to have *secundem* defects, encourages the physician to refer all such patients, notwithstanding age or the possible coexistence of anomalous pulmonary venous drainage into the right auricle or superior vena cava. If the nature of the auricular defect includes deformation of the tricuspid or mitral valves, the additional time provided for the surgeon by the artificial cardiac by-pass makes this aid imperative.

The tetralogy of Fallot remains a serious problem. The Blalock anastomotic procedure is now performed rarely, and only as a life-saving measure, while all centres are trying hard to lower the high operative loss from direct simultaneous operation upon the ventricular septal defect and the pulmonary stenosis with the aid of the heart-lung by-pass.

The best figures quoted came from the Mayo Clinic and the University of Minnesota—from 75% to 80% of survivals. Many children survive an operation which involves the placing of an ivalon insert in the wall of the right ventricular outflow tract and the pulmonary artery, with closure of the ventricular septal defect, but die from circulatory failure a few days later. A follow-up investigation at Baltimore of the first 500 patients operated upon there by the Blalock procedure ten years ago, shows that 350 are still alive. Another report was that of the children treated by the Potts procedure: 20% had needed a second operation to lessen the size of the communication between the aorta and the pulmonary artery. In discussion on the post-commissurotomy syndrome, an interesting theory that it was due to allergy to blood was suggested. It occurs after a number of other cardiac operations.

A very successful procedure, in which the artificial heart is used, has been the closure of acquired communications between a sinus of Valsalva and the right ventricle or auricle. Remarkably good results have also been achieved in by-passing, with the aid of an orlon tube graft, arteriosclerotic obstruction at the origin of the innominate and left carotid arteries from the aortic arch. Operations admittedly hazardous, but with a few survivals, have been developed for rearranging the intracardiac circulation in infants and children with transposition of the great vessels.

Angiocardiography.

Angiocardiography overseas is now mainly "selective", with the use chiefly of "Urografin" (70% iodine) and "Urokon" (in a dose of 1·5 c.cm. per kilogram of body weight per second). The use of carbon dioxide as a contrast agent involves some risk, and was rarely heard of. Direct injection of dye into the ventricles (ventriculography) has been used both on the Continent and in the U.S.A. for delineation of the internal topography of the ventricles, particularly for the display of subvalvular obstructions, and for assessing degrees of mitral incompetence. Increasing interest in possible coronary artery surgery has led to determined attempts to visualize the coronary arterial tree by dye injected close to the coronary ostia. To obtain good pictures, it is necessary to produce cardiac asystole by acetylcholine administered through the end of the same catheter as the dye. This catheter is introduced at the brachial artery and threaded backwards to the origin of the aorta, and is provided near its tip with a balloon, which can be inflated just prior to dye injection and so keep the dye in the region of the aortic root. Origin of the left coronary artery from the pulmonary artery has also been successfully demonstrated in some infants with "idiopathic dilatation of the heart", so that the surgeon has been given an opportunity of transplanting it to the aorta. Several papers also emphasized the radiation hazard to both the patient and the operator by over-enthusiastic X-ray investigation, particularly repetitive fluoroscopy and multiple radiography. This danger gives added emphasis to clinical semeology and physical examination.

Hypertension.

The subject of high blood pressure was as usual well to the fore, and featured as one of the major symposia. Braun-Menendez (Argentine) pointed out that experimental hypertension did not retain its original characteristics, but was influenced by many secondary factors, which interfered with its mechanism and evolution, and that not always should a single cause be sought, either in the laboratory or in the patient. Perera (U.S.A.), who had studied over 3000 patients, said that 5% of the population would develop a diastolic blood pressure of 90 mm. of mercury or higher at a casual examination. Such patients developed complications at a variable rate. He agreed that inheritance was probably the most potent predisposing factor. For instance, of 100 hypertensive patients, aged less than 40 years, 64 had a "positive" family history. Rise in blood pressure with age was not a simple relationship, and was influenced by many accidental factors, as well as related abnormal conditions such as nephritis. Primary diastolic hypertension was a distinct entity, not merely a part of the "normal blood pressure spectrum of mankind", and the dividing line of 90 mm. of mercury was probably a valid one. It was twice as common in women as in men, and only in women was body build a significant associate; there were no other proven factors apart from inheritance and obesity. The higher and more fixed the diastolic blood pressure, the worse the prognosis. Thus 25 hypertensives whose blood pressure failed to fall significantly after rest, died at an average age of 44 years while 25 who showed instability in their readings died at an average age of 56 years. The percentage of primary hypertensives who developed malignant or accelerated hypertension was very small; that suggested an entirely separate and superimposed process. Males predominated, and over 30% were aged between 37 and 42 years. Progressive retinal and renal disease in that illness could occur even after reversal of high blood pressure. There was still great need for bedside research into that formidable variety of essential hypertension.

The view that essential hypertension is a specific disease entirely is not that of Pickering (England), who believes that blood pressure behaves as a graded character as regards its inheritance and its effects on vascular pathology. Bastenie believes that the suprarenal cortex plays an important role in certain types of hypertension; but the number of patients presented to support these views was inadequate.

Roth and Kvale (U.S.A.) dealt with the interference in the chemical diagnosis of phæochromocytoma caused by certain drugs such as chlorpromazine and tetracycline, lymphoblastoma or antihypertensive drugs or sedatives. They emphasized the need for a combination of pharmacological and chemical tests as the best assurance of a diagnosis.

Collagen Disease.

In another symposium on collagen disease, the view was advanced that hypersensitivity arteritis was probably the basis for coronary atheroma in the young, and also caused "pulseless disease" of Takayashu, or even aortic stenosis. It was suggested (Griffith, U.S.A.) that a study of the coronary arteries in pulseless disease might reveal similarities to those seen in rheumatic fever, because of the allergic granulomatous nature of this disease. Surgical relief cannot be curative, and treatment must depend on anticoagulants and anti-hypersensitivity substances such as the corticoids, which, however, themselves may become antigenic.

Scleroderma Heart Disease.

Oram (England) discussed scleroderma heart disease, and described five further instances with autopsy confirmation. He pointed out that though this was a distinct variety of collagen disease, the coronary arteries were unaffected, the main lesion being delicate cellular infiltration of the myocardium, sometimes followed by calcification. Rossi, from a review of more than 200 cases of endocardial fibro-elastosis, stated that 25% of cases occurred in the first six weeks of life, and 50% under the first six months. In most cases there was retarded growth, a pertussis-like cough and an endocardial murmur. X-ray films and electrocardiograms showed left-sided cardiac enlargement. Cortisone therapy might be worthy of trial. Löffler described 26 cases of what he called parietal fibroplastic endocarditis with eosinophilia, usually in young males, which should be distinguished from fibro-elastosis and the endomyocarditis found in Africa, in which high-grade eosinophilia is not a constant feature.

Physiology.

Symposia on matters of physiology dealt with humoral factors in the control of the circulation. Von Euler (Sweden) pointed out that large variations had been observed in the sensitivity of different vascular regions to noradrenaline. The lung and arterial vessels were relatively insensitive, while those of the skin and kidneys were highly sensitive. Both adrenaline and noradrenaline constricted the veins and caused a shift of blood centrally. Posture and muscular work had marked effects on the excretion of noradrenaline by the kidneys. Swan and Henry described stretch receptors in the thorax which regulate blood volume. These are probably located in the left atrium. Guyta (U.S.A.) pointed to the greater importance of venous resistance as compared with arterial or capillary resistance in regulation of venous return.

Chronic Cor Pulmonale.

A symposium on the evergreen chronic cor pulmonale attracted much attention. Orie emphasized the "spastic" as well as the toxic burdens superimposed on chronic cor pulmonale, and stated that bronchial relaxation should be as much a part of treatment as antibiotics.

Ferrer (U.S.A.) pointed out that hypoxia was only one of several interdependent mechanisms responsible for pulmonary hypertension, and inhalation of oxygen-rich mixtures to the point of normal arterial saturation would not always relieve elevation of pulmonary pressure. Patients who had recovered from right heart failure, and who showed pulmonary hypertension on exercise but no actual desaturation, had a decrease in the pulmonary vascular bed, whereas those actually in failure invariably showed anoxia also, and acetylcholine would lower their pulmonary blood pressure, even during exercise. Frequent estimation of arterial blood oxygen content formed a good method of prognosis in emphysematous subjects with chronic cor pulmonale.

Buhlman (West Germany) pointed to two causes of increased pulmonary resistance in acute and chronic cor pulmonale: first, organic lung damage of any kind, in which the fixed resistance could be lowered only by reducing cardiac output; secondly, a reversible type dependent on anoxia. He said that the two types were often combined. Selective angiocardiography of a part of the pulmonary vascular tree gave a clear indication of the fixed reduction in the diameter of the pulmonary blood vessels in emphysema.

Halmagi (U.K.) suggested that the ventilation-perfusion ratio should be regarded as an important item in assessing therapy in chronic pulmonary heart failure. Oxygen should not be denied to patients in severe emphysema because of the risk of carbon dioxide narcosis, but should be given intermittently and with circumspection, and preferably with the aid of positive-pressure artificial respiration. Diamox might assist in restraining a rise in blood carbon dioxide content.

Good practical advice on the treatment of respiratory failure by oxygen was provided by Wade (England), who pointed out that the fear of carbon dioxide narcosis had been exaggerated, and that only a minority of patients developed it. They could be detected by careful observation, rather than by the initial pH and carbon dioxide tension. Rapidity of increase of carbon dioxide seemed to be an important factor. Intermittent administration of oxygen by the use of positive-pressure pumps and tracheotomy were helpful in severe cases.

Myocardial Failure.

The difficult question of the mechanisms of myocardial failure and their clinical and laboratory recognition emphasized the different national approaches to physiology which have often hindered discussion in the past, but for which these round-table conferences assist in finding a common starting point.

One would have expected much more discussion on the value of sustained treatment of myocardial infarction by anticoagulants. Wright (U.S.A.), one of the most steadfast believers in this practice, preached that even after a single attack the death rate was three times greater in a control group in a five-year period than among the treated group. In recurrent myocardial infarction, the rate was five times higher in the untreated groups. He pointed out that many problems accompanied the widespread institution of anticoagulant therapy, particularly the dearth of well-trained technicians, the variability of thromboplastin standards, and economic difficulties. Only reliable and intelligent patients should be accepted as candidates.

Andrews (U.S.A.), in the same conference, discussed the "anti-cholesterol" substances, and pointed to the very scanty evidence that iodides, thyroid derivatives, œstrogen, heparin, nicotinic acid or plant sterols did anything to lower the likelihood of future coronary disease. There is no doubt that certain fatty acids will lower serum lipid levels, even if the total fat content in the diet is not reduced, and this may yet be the least unnatural method of attack. However, weight reduction still remains the most potent therapeutic aid in coronary insufficiency.

The serum glutamic oxyacetic transaminase estimation has proved its worth in the diagnosis of myocardial damage, provided acute injury to the liver or kidney cells can be excluded—e.g., acute congestive heart failure. A figure of 350 units is frequently associated with high mortality rate. Acute pericarditis and pulmonary infarction are not accompanied by high rises in transaminase activity. Further, serum enzyme activity does not correlate well with non-specific reactions such as the leucocyte count, red-cell sedimentation rate and C-reactive protein estimation. Sampson (U.S.A.) strongly advocated active pressor therapy early in severe myocardial infarction accompanied by shock. Noradrenaline given in high dosage if hypotension continues, and "Mephenterol" ("Aramine") have been the two most valuable agents used.

Rheumatic Fever.

Advances in the epidemiology and treatment of rheumatic fever formed another important conference. A delegate from the U.S.A. pointed out that the epidemiological features of rheumatic fever were actually a reflection of the occurrence of streptococcal infections within the population. Once rheumatic fever developed, the living streptococcus dominated the development of rheumatic heart disease, and the prevalence of the disease was quite explicable by those factors affecting multiple interpersonal contacts. In treatment, the organism must be eliminated from the pharynx, otherwise the attack rate was not reduced below that of controls. Variations in the carrier state might explain some of the features of rheumatic fever. Some studies suggested that the pathogenesis of the joint and other manifestations of rheumatic fever were different from those involved in rheumatic heart disease. All children with rheumatic fever should receive penicillin in full dosage within the first nine days. By that means, the incidence of cardiac involvement could probably be reduced. With regard to suppressive effect, the steroids were more potent than the salicylates, but involved a somewhat greater risk of spreading infections. If suspicions of active endocarditis or pericarditis arose, one of the steroids was the drug of choice.

Keith (Canada), in assessing the value of laboratory tests, said that alpha globulin estimation provided a more sensitive index of rheumatic activity than the sedimentation rate, and that values of over 500 units of anti-streptolysen O provided good evidence of active hæmolytic streptococcal infection. Massell (U.S.A.) holds that minimum indications of heart damage generally appear

early, and that in patients without murmurs, the risk of later heart disease is relatively slight.

Bacterial Endocarditis.

With regard to the choice of antibiotics for the "tough" case of bacterial endocarditis, it was agreed that excessive amounts of penicillin should always be used when other antibiotics were employed, as the emergence of resistant strains to the latter appeared to be delayed by such combinations. The fact that the myocardium suffers as much from multiple embolization as the kidneys and periphery may play a considerable role in the high (70%) incidence of cardiac failure in most series reported. Hayward (London) reported a mortality within two years of infection of 43% among 112 patients, and stated that the prognosis for patients aged over 45 years in England had improved little since the introduction of antibiotics. This he attributed to resistant organisms, delayed diagnosis and myocardial damage.

Pulmonary Hypertension.

Paul Wood (England) maintained, in view of the common fall of pulmonary blood pressure in all states of pulmonary hypertension, however produced, after administration of acetylcholine, that there was a vasoconstrictive reaction to the high pulmonary blood pressure itself which tended to increase and maintain it. Obliterative pulmonary vascular disease followed, and thrombo-obstructive complications completed the picture. Scébat (France), as a result of the production of artificial clot emboli in the lungs of dogs, concluded that the size of the clot was not important except in massive embolism, but that reflex vasoconstriction from mechanical stimulation of receptors located in the pulmonary arterial walls was responsible for the pulmonary hypertension. This did not exceed two hours in duration, and was reversible by atropine and hexamethonium.

Arteriosclerosis.

In the symposium on arteriosclerosis, Oliver (Scotland) spoke of the effects of hormones on the circulating lipids. He said that their undoubted effect could be due to alterations in the rate of intrinsic cholesterol metabolism, or in the distribution of lipoproteins between the plasma and the interstitial fluid. He concluded that there was no entirely satisfactory hormonal therapy for hypercholesterolæmia, without the risk of increasing the oxygen requirements of the myocardium or of feminization. Moore and Page (U.S.A.) discredited the serum level of cholesterol as an individual predictor of coronary disease, but held that further epidemiological and chemical studies would eventually point to a more reliable index, in relation to the close association between coronary disease and an elevated serum level of lipids.

Raynaud and Pasquet (France), after electrophoretic studies, have concluded that a relationship exists between blood coagulability, beta lipoproteins, and the rate of movement of fatty acids in the serum electrophoretogram.

Ancel Keys (U.S.A.) remains convinced that, epidemiologically speaking, cholesterol is closely related to the saturated fatty acid content of the national dietary—to the proportion of fat calories—and that notwithstanding fairly high fat rations, the incidence of coronary heart disease is low in those countries where unsaturated fatty acids are taken in abundance.

Ventricular Septal Defect.

A group of papers on ventricular septal defect was opened by Campbell (England). He asked that the terms *"maladie de Roger"* and "Eisenmenger's complex" should be dropped, and that classification should depend on the size and direction of the shunt and on the level of the pulmonary vascular resistance. The size of the heart depended on the size of the left to right shunt. Pulmonary regurgitation occurred in one-third of hypertensive patients. Prognosis was increasingly bad after the age of 15 years, and few patients with large hearts survived to 40 years. The larger the defect, the smaller the pressure differential between the ventricles. When pulmonary stenosis coexisted (10% of cases) it diminished the left-to-right shunt and "protected" the lungs. In such cases operation could be deferred until one was prepared to deal with both abnormalities at once.

Cardiac Metabolism in Myocardial Infarction.

Cardiac metabolism in myocardial failure, as estimated by a chemical study of coronary sinus blood, was discussed by Bing (U.S.A.). He said that after experimental myocardial infarction, coronary flow and myocardial oxygen usage were decreased. Those dynamic alterations were accompanied by partial glycolysis in heart muscle, so that pyruvate and lactate concentrations exceeded those in arterial blood. The myocardial usage of oxygen, glucose, pyruvate, lactate, fatty acids, amino acids and ketones was the same in individuals with and without chronic myocardial failure. No change was found in the respiratory quotient. Bing concluded that chronic failure was the result of disturbances in energy utilization. This view is supported by the observation that the contractility of actomyosin bands prepared from failing human hearts is diminished.

Mechanisms of Heart Failure and Electrolyte Behaviour.

Mechanisms of heart failure and electrolyte behaviour all came in for review, as well as the local visceral and regional circulations. Merrill (U.S.A.), speaking of factors affecting the renal circulation, suggested that disproportion between effective circulating blood volume, extracellular fluid volume and tissue demands might result in increased venomotor tone, which was mediated by reflexes from baroreceptors in several locations. Both the secretion of aldosterone and intrarenal vasoconstriction appeared to be affected by increases in venomotor tone in such a way as to cause sodium retention by the kidney. The peripheral arterial circulation was considered only in regard to new electronic methods of measurement of digital and muscle flow.

The Coronary Circulation.

Another notable symposium was devoted to the coronary circulation, an increasing area of interest to both physicians and surgeons. There appears to be increasing support for Duguid's theory that atherosclerotic plaques are retracted thrombi which have been overgrown by intimal endothelium, and have then undergone superficial organization with fatty degeneration in the deeper part of the layer. The question why the coronary arteries are so frequently and extensively diseased remains unanswered. Bedford (England) indicated the need to separate regional infarction due to occlusion of a single coronary branch and through generalized ischæmia due to narrowing of the coronary ostia, from multiple block of the coronary trunks or from various extracoronary causes such as anæmia, reflexes from diaphragmatic hernia, paroxysmal tachycardia, etc. Pulmonary angina pectoris is a further category.

"Coronarography" is described as a technique whereby both coronary arteries are injected simultaneously by a radio-opaque fluid, which permits assessment of gradient at the two ends of an anastomotic collateral vessel, as well as variations in the size of the muscle mass supplied by what appears to be a constant artery.

The Pulmonary Circulation.

The pulmonary circulation continues to receive intensive study. Denolin (Belgium) in a discussion of its physiology drew attention to ready distortion which could affect laboratory measurements, and to how those errors became exaggerated in certain commonly used formulæ. He pointed to the importance of an accurate determination of the intrathoracic blood volume, and a reasonable concept of the anatomical state of the vessel walls.

Earl Wood (U.S.A.) pointed out that three factors determined the hæmodynamics of ventricular septal defect —namely, the aortic and pulmonary resistance and the size of the defect. In effect, that usually meant the size of any pulmonary stenosis present or of the degree of pulmonary vascular resistance. Defects of less than 1 sq. m. prevented equalization of left and right ventricular systolic pressures. In defects of larger size ventricular pressures were equalized, and pulmonary vascular resistance determined the pulmonary blood flow and the size of the intracardiac shunt.

Soulié (France) and his associates have decided that operation is too risky to be justifiable in cases in which the pulmonary arterial pressure exceeds 60% of the systemic pressure. They believe that death in such cases is due to too sudden a change in the load to which the left ventricle has become accustomed. They have also noticed in some cases a gradual fall in the pulmonary pressure without operation, due, they think, to a gradual development of a subvalvular muscular obstruction in the right ventricle. They stated that sufferers from the Eisenmenger complex often lived in comfort to 40 or more years, and that the degree of pulmonary hypertension in muscular defects did not always bear a direct relationship to the size of the defect.

Acquired Valvular Disease.

At a meeting on acquired valvular disease, the accent was on criteria of operability. Six haemodynamic patterns in mitral disease were described by Harvey (U.S.A.), depending on various grades of mitral block, pulmonary block and the differential effect of exercise on each. In her view it is still uncertain which haemodynamic abnormalities should be attributed to mitral insufficiency, and therefore which patient should be offered surgery. Snellen (Holland) had found that a combination of phonography and apical cardiography often avoided any need for cardiac catheterization in mitral lesions, and in aortic valve disease, a combination of cardiac tracings and phonocardiography. Disappointingly, there were only a small number of good follow-up studies reported. Blount (U.S.A.) presented interesting results on patients with tricuspid stenosis, studied at rest and after exercise both before and after operation.

Social Cardiology.

In the symposium on social cardiology, various speakers led by Biörck (Sweden) indicated the relatively minor study given in most countries to the social implications of heart disease, to the economic loss, and to the inadequate machinery for rehabilitation of workers who have experienced a cardiac accident. In America more progress has been made than elsewhere, and work classification centres in industry now play an important role in maintaining patient morale, and in preventing the total loss of many experienced and skilled workers badly needed in an age of technology. Attention was drawn to the fact that in most countries inadequate recognition of the prevalence and destructive potential of heart disease has resulted in an absence of any machinery specifically directed towards the social alleviation of heart disease, for the better education of the physician in cardiac diagnosis and of the public towards a new and more hopeful outlook in this field. Biörck emphasized the psychological limitations of the cardiac, which are often as crippling as the physical. Rehabilitation was defined by Hellerstein (U.S.A.) as a "process by which a patient is returned realistically to his greatest physical, mental, social, vocational and economic usefulness, and if employable, is provided an opportunity for gainful employment in a competitive world". Speaking of the insurance of sufferers from coronary disease, Ungerleider (U.S.A.) stated that an increasing number of studies showed that life expectancy in selected groups was far better than was formerly supposed, and that underwriting was being undertaken on an experimental basis.

Conclusion.

All this information and much more can be culled from the six orations, the 12 round-table conferences and the 24 symposia which were crowded into six busy days. Little has been quoted from the 500 individual communications which were also read in their entirety during the same period of time. Fifty further papers were read by title only. Each communication had received the endorsement of the national society of which the author was a member. It is obvious that a new system must be evolved to limit the size of the programme without the loss of any of its scientific value, and this will be one of the main problems to be faced by the new International Council before the fourth Congress in Mexico City in 1962.

The technical exhibition of medico-surgical equipment was very impressive, with British, American, German, French and Swedish radiological, electronic and laboratory recording apparatus in profusion, vying with each other in claims and price. An unwary spectator might suddenly find that he had unconsciously ordered tens of thousands of pounds worth of laboratory machinery in a single perambulation of these exhibits, when all he thought he was doing was putting down his name and address for further descriptive literature. Among the machines available are smaller biplane angiocardiographs, image intensifiers, which allow of daylight cardiac catheterization with minimum radiation. Some of these are included in a complete cardio-investigatory unit, with cine-angiography in addition. The technique, by which the intensified image of the dye in circulation is photographed in 16 mm. film, has the advantage of subsequent reprojection, as frequently as desired, with arrest or slow motion at any critical point of observation. In time it will be developed in two simultaneous planes, and will probably displace the present disconnected films of the standard high-speed angiocardiograph. From Paris came a cardiac catheter with a micromanometer in its extremity, which allows of direct representation of pressure and sound, with electrical rather than fluid transmission to the butt of the catheter and so to an amplifier, a recorder or a microphone. By this means, it was stated that intracardiac localization of sound permitted the precise diagnosis of its origin to be made, and that the site of several intracardiac fistulæ had been accurately determined prior to operative closure. A "planograph", which gives horizontal X-ray sections of the thorax or abdomen, was also on view, and could be obtained immediately for some $7000.

Automatic syringes ensuring a constant delivery of dye into a vein or the heart are now obtainable in all sizes, operated by a small electric motor. A cardiograph, which records 12 leads simultaneously, was exhibited by a German manufacturer and a small portable machine operated by transistors. Many recording devices of considerable complexity were offered for inspection and comparison. Electronic observers and indicators of heart rate, blood pressure and blood oxygenation are now available for use during and after cardiac operations, and after myocardial infarction. Internal and external pacemakers, with or without the capacity to deliver a defibrillatory shock, were also demonstrated.

In conclusion, the Australian delegates are deeply grateful to their Belgian colleagues for their splendid organization in the face of many difficulties, and for their generous welcome to their beautiful city.

FIRST INTERNATIONAL SYMPOSIUM ON ANTI-INFECTIOUS AND ANTIMITOTIC CHEMOTHERAPY.

THE first International Symposium on Anti-Infectious and Antimitotic Chemotherapy will be held at Geneva on September 12 and 13, 1959. The Patrons will be Professor E. B. Chain, Professor D. Bovet and Professor S. A. Waksman, and the President will be Professor G. Bickel. The symposium will take the form of reports and panel discussions on the following topics: (i) sulphonamides with long-lasting action; (ii) antibiotic associations and resistant staphylococci; (iii) antimitotics and medullary grafts. Further information may be obtained from Dr. P. Rentchnick, Case Stand 471, Geneva, Switzerland.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

DISSECTION IN SYDNEY.[1]

[From the *Australasian Medical Gazette*, May, 1883.]

DIFFICULTIES in procuring subjects for dissection in connection with the Medical School at the Sydney University have already arisen, and are not unlikely to occur from time to time, owing to the "Anatomy Act", passed by the late Parliament, not containing a compulsory clause, to compel superintendents of hospitals and asylums to deliver to the School of Anatomy the unclaimed bodies of persons having no relatives or friends.

In other respects the Act is good and workable, but the business in connection with it is delicate and involves some serious possibilities. Our Act is based on that in England, which several English Governments have admitted to be incomplete in this one particular, unfortunately cardinal, detail—but have declined to amend it: preferring to meet the difficulties entailed through the deficiency in the Act by pecuniary assistance from a source usually supposed to be associated with the diplomatic service, viz.—the Secret Service Fund. It is indispensable to the public safety that there should be no mystery about the deaths of persons whose remains are to be taken to the dissecting rooms: and there exist special reasons why the bodies should in preference be taken from public institutions. We have reasons for believing that bodies in sufficient number could be obtained from the Government Asylum at Parramatta and elsewhere: and, doubtless when the Anatomy Act is established and in working order, this will be done: let us hope judiciously, with just regard to the susceptibilities of the

[1] From the original in the Mitchell Library, Sydney.

poor, and a prudent remembrance of possibilities as revealed in many a dismal annal in the old countries. The dangers associated with the practice of buying bodies from private persons are of the most serious character, though there is not much difficulty in obtaining them from such sources, particularly in a city like Sydney containing a large vagrant population, with a full proportion of criminals of nearly every European nationality.

Correspondence.

ALCOHOL AS A FACTOR IN MEDICO-LEGAL SUDDEN DEATHS.

SIR: I have read with interest the note by Dr. C. Duncan in your Journal of March 7, 1959, page 322, in which he discusses alcohol as a factor in medical legal sudden deaths.

In view of the increasing importance paid to blood alcohol levels, I should like to comment on Dr. Duncan's article. Blood alcohol levels in samples taken from dead bodies may be very misleading, and this must be taken into account by all individuals engaged in medical legal practice. In this connexion I would quote a judgement of the Supreme Court of Natal, October 14, 1958 (Nathan versus Ocean Accident and Guarantee Corporation Ltd.). Blood taken from a dead body 24 hours after death was found to show over 300 mg. of alcohol per 100 ml. This would seem to have been overwhelming evidence in favour of alcohol having been ingested; but the judge refused to accept this interpretation, largely on the basis of evidence given by Dr. Joubert, Biochemistry Department, University, Natal. Not only did Dr. Joubert point out the obvious two faults, such as the cleaning of skin with alcohol (not done in the case under review), not taking the blood from the heart, etc. He also did point out that a blood culture must be carried out on such bloods taken for alcohol estimation, since certain saprophytes are capable of producing false positive reactions, also that false positive reactions may be obtained from blood in the femoral vein when the pancreas has been severely damaged by the trauma causing death.

I may add that in this case quoted, supporting evidence existed to the effect that the deceased was perfectly sober at the time of his death.

Yours, etc.,

W. LAURIE.

Perth Chest Hospital,
Nedlands,
Western Australia.

April 3, 1959.

WORK FOR THE HANDICAPPED.

SIR: I should like to draw attention to the need for sheltered workshops in Australia, and to allay the fears of *"Medicus"*, who writes in your Journal of April 4, and who seems very uncertain about their functions. Perhaps he has little experience in this field and therefore does not understand our difficulties.

Sheltered workshops are of three types. (i) Static, such as the Civilian Maimed and Limbless Association, where seriously disabled people have banded together to augment their pensions with the small incentive payments permitted by the pension authorities. Mostly they are unable to compete in ordinary industry. (ii) Progressive workshops. These are training centres, where people who have been physically and mentally conditioned in the Rehabilitation Centres may be vocationally conditioned to increase their work tolerance or undergo work training under factory conditions, while preparing to return to their own or selected employment. In these projects they increase their work tolerance from two or four hours to eight hours daily. (iii) Pre-placement workshops. These are the final polishing centres, where they work eight hours daily, five days weekly, transport themselves to and from their work in peak hours, punch the bundy and learn to make home adjustments suitable to their job requirements.

To place a disabled person, one has to sell a skilled product and know that they can remain in a job. The final testing area proves or disproves their ability and assures satisfactory lasting placement, gaining the goodwill of employers and fellow employees who are doubtful about the ability of the disabled to compete equally with them.

Organizations like Abilities Incorporated in Long Island, New York, have proved that when properly trained, the performance of the disabled is equal to, if not better than, the able, and that their days of absenteeism are much less.

No one wishes to sell us to socialization of I.L.O. or any other organization; but every human being has the right to be helped to return to independence and wage earning, and experience overseas has proved by results achieved by sheltered workshops, properly managed and skilfully conducted, that they are the best method of achieving this.

All we ask is Government subsidy to establish them and bear the losses until they are functioning. They do become self-supporting. This has been proved by Bedford Industries in South Australia.

I do not agree with the statement in the Leading Article of February 28 that any practitioner is capable of work assessment. It requires all the special skills of the whole team to evaluate an individual properly.

Having visited many institutions in Canada, U.S.A., Great Britain and Europe, and made a special study of this subject, I do feel competent to comment, and also to urge all members of the profession to help us to help the disabled to be a human asset instead of a national liability, and to forget any petty jealousies that tend to hamper the main aim—of unselfish service.

Yours, etc.,

M. NAOMI WING,
Honorary Medical Director, Royal South Sydney Hospital Rehabilitation Centre.
Honorary Secretary, Rehabilitation Coordinating Council of New South Wales.

235 Macquarie Street,
Sydney.

April 4, 1959.

Post-Graduate Work.

AUSTRALIAN VICE-CHANCELLORS' COMMITTEE.

Nuffield Dominions Trust: Appointments at Oxford Medical School.

THE Registrar of the University of Oxford has advised that nominations are now invited from Australian universities to fill four appointments in the Oxford Medical School in the academic year beginning next October. The appointments are: (a) two demonstratorships tenable in any one of the following departments: biochemistry (three-year tenure preferred), human anatomy (three-year tenure preferred), physiology, pathology (one vacancy only); (b) two clinical assistantships in any one of the following departments: clinical medicine, orthopædic surgery (three-year tenure preferred), obstetrics and gynæcology (two-year tenure preferred), anæsthetics. Except as stated, the appointments will be tenable for either two or three years, whichever is more convenient to the nominating university. Applicants are requested to indicate clearly the period of appointment agreeable to their university.

Medical deans have been supplied with information on the main research topics current in these departments. Duties will commence on October 1, 1959, or as soon thereafter as possible.

Conditions.

1. The qualifications for appointment to a demonstratorship shall be graduation at one of the Dominion universities and previous experience in research.

2. The qualifications for appointment to an assistantship shall be graduation at one of the Dominion universities and a medical qualification obtained in one of the said Dominions or in Great Britain.

3. No person shall be appointed either to a demonstratorship or to an assistantship who does not intend that immediately after such appointment shall terminate he will return to the Dominion from which he was appointed for at least five years' work of a like nature as that carried out by him during his appointment.

Emoluments.

Stipend: Women or single men, £950 sterling per annum, married men £1150, in both cases subject to payment of United Kingdom income tax.

Travel Grant: £450 sterling, available half on appointment and half on completion of appointment.

Applications.

Letters of application, in duplicate, supported by the dean of the faculty of medicine in which the applicant trained or of the university with which the applicant is now associated, should be lodged with the Secretary, Australian Vice-Chancellors' Committee, c/o University of Melbourne, Carlton, N.3., Victoria, by not later than Friday, May 1, 1959. Further information of the details and conditons of appointment under the Nuffield Dominions Trust may be obtained from the Registrar of each of the Australian universities.

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

Programme for May, 1959.

Country Courses.

Bendigo.—On May 1, at Bendigo Base Hospital, at 8 p.m., Dr. Maurice Clarke will lecture on "Myocardial Infarction". The local secretary is Dr. M. Clark, 98 Mitchell Street, Bendigo.

Sale.—On May 9, at the Gippsland Base Hospital, the following programme will be given: 2 p.m., "Neonatal Jaundice", Dr. Elizabeth Turner; 4.15 p.m., "Surgery of Congenital Abnormalities", Mr. Russell Howard; 7 p.m., two short papers on "Mr. Ewing—First Surgeon of Flooding Creek (Sale)", by Dr. Frank Forster and Dr. Bryan Gandevia, representing the Historical Section of the Victorian Branch of the B.M.A.; 8 p.m., "The Newborn Infant—Normal and Abnormal", Dr. V. L. Collins; 9.15 p.m., quiz session. The local secretary is Dr. N. Gordon, Base Hospital, Sale.

Hamilton.—On May 16, at the Glenelg Base Hospital, the following lectures will be given: 3.45 p.m., "Urinary Calculi, Including Calculus Anuria", Mr. K. Burnside; 5.15 p.m., "Tetanus", Dr. J. Forbes. The local secretary is Dr. R. Sobey, 6 Spence Street, Warrnambool.

Fees: Fees for the courses at Bendigo, Sale and Hamilton are at the rate of 15s. per session, but those who have paid an Annual Subscription to the Committee are admitted without further charge.

Flinders Naval Depot.

On May 18, at Flinders Naval Depot, at 2.30 p.m., Mr. K. C. Bradley will discuss "Intracranial Hæmorrhage". This lecture will be given by arrangement with the Royal Australian Navy.

Demonstration at Eye and Ear Hospital.

On Saturday, May 2, the following demonstration by the honorary medical staff will be held at the Eye and Ear Hospital:

9.30 a.m. to 11 a.m.: "Eye Conditions of Interest", Dr. F. G. Fenton; "Demonstration of Cases of Common Eye Conditions', Dr. E. D. O'Brien; "Ocular Torticollis", Dr. R. F. Lowe; "Common External Conditions of the Eye", Dr. G. Sutherland; demonstrations of ear, nose and throat cases of clinical interest, Mr. C. Cantor, Mr. R. H. Stevens, Mr. W. E. Williams and Mr. D. F. O'Brien; "Inspection of Deafness Investigation and Research Unit", Dr. C. B. Napier; "Allergy Cases of Clinical Interest", Dr. S. Brand.

11.15 a.m. to 12.15 p.m.: "Coloured Transparencies of Common Ocular Lesions", Dr. Kelvin Lidgett.

A quiz session will conclude the programme. All the demonstrations are open to the medical profession, and there is no charge for attendance.

Psychiatry Courses.

A course in psychiatry conducted by the Australasian Association of Psychiatrists will be held on Thursdays at 8 p.m. at the Royal Melbourne Hospital, as follows: May 7, "Bases of Personality in Emotional Disorders', Professor W. H. Trethowan, professor of psychiatry, University of Sydney; May 14 and 21, "Treatment", Dr. R. Kingston.

A course conducted by the Department of Mental Hygiene is held on Tuesdays from 8 p.m. till 10 p.m. The continuation of the series, "Symposium on Alcoholism", commences in April. The course is held at the Royal Park Receiving House.

Overseas Lecturers.

Sir Horace Smirk, Professor of Medicine, Otago, New Zealand, will lecture at 8.15 p.m. on Thursday, May 21, in the Medical Society Hall, on "Very Premature Systoles". On Friday, May 22, he will visit the Royal Melbourne Hospital, and lecture at 1 p.m. on "Recent Advances in the Treatment of Hypertension", the general members of the medical profession being invited.

Dr. A. Rae Gilchrist, President of the Royal College of Physicians, Edinburgh, and Physician to the Royal Infirmary of Edinburgh, will lecture at 8.15 p.m. on Friday, May 22, in the Medical Society Hall on "Clinical Problems of Digitalis Therapy".

The evening lecture on May 21 is part of the annual subscription course. Non-subscribers will pay a fee of 15s.

June Programme.

A post-graduate course in medicine will commence at St. Vincent's Hospital, Melbourne, on June 1, and continue till July 11. This will be suitable for candidates studying for the degree of M.D. and for the M.R.A.C.P. Enrolments should be made through the Melbourne Medical Post-Graduate Committee by May 15, 1959.

Dr. R. F. Farquharson, Professor of Medicine, University of Toronto, will visit Melbourne from June 21 to July 5. Details of his programme will be announced next month. His lectures will form part of the annual subscription course.

Library of Recorded Lectures.

The following additional microgroove recordings are available from the Post-Graduate Committee: "Recent Observations on the Radiology of the Gastro-Œsophageal Junction", by Professor Alan Johnstone, of Leeds—two ten-inch disks, 36 slides (two inches square); "Treatment and Prognosis of Burns", by Mr. W. Gissane, of Birmingham—two ten-inch disks, 58 slides (two inches square).

Course in Anæsthetics.

The Victorian State Committee of the Faculty of Anæsthetists will conduct a full-time course of lectures and practical demonstrations lasting two weeks from July 6, 1959. It will be suitable for candidates preparing for Part II of D.A. and F.F.A.R.A.C.S. The fee is £10 10s.

Calendar of International Congresses.

The Post-Graduate Committee has received the January, 1959, issue of the "Calendar of the Council for International Organizations of Medical Sciences".

Address.

The address of the Melbourne Medical Post-Graduate Committee is 394 Albert Street, East Melbourne. Telephone: FB 2547.

SEMINARS OF THE DEPARTMENT OF SURGERY, UNIVERSITY OF SYDNEY.

Owing to unforeseen circumstances, it has been necessary to make an alteration in the programme of seminars at the Department of Surgery, University of Sydney. Mr. R. A. Money will speak on "Cerebral Angiography" on Tuesday, May 5, and Mr. N. Wyndham on "Hyperparathyroidism" on May 19, 1959.

POST-GRADUATE MEDICAL FOUNDATION OF THE UNIVERSITY OF SYDNEY.

Applications for financial assistance from the Post-Graduate Medical Foundation of the University of Sydney are now invited. The applications must be addressed to the Post-Graduate Committee in Medicine in the University of Sydney, and must be made through or by university departments, hospitals and other institutions or organizations.

Applications should be made on the forms provided. It is expected that the applications will fall under one or more of the following three broad headings: research grants to individuals; educational or research grants to institu-

tions; fellowships at home and abroad. Applications which do not fall under these headings should be made separately in writing, and should contain all details. Any previous applications must be resubmitted on the relevant form.

The necessary forms and any further information may be obtained from the Honorary Director, the Post-Graduate Committee in Medicine in the University of Sydney, 131 Macquarie Street, Sydney, to whom the completed application forms must be returned by noon on Monday, May 4, 1959.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes etc. are published in the *Commonwealth of Australia Gazette*, No. 18, of March 12, 1959.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-going Forces).

Appointments.—John Francis Killick, Alan John Lyne and Gordon Chisholm Shirreffs are appointed Surgeon Lieutenants (for Short Service) (on probation), dated 21st November, 1958. Victor St. Clair Dudgeon Logan is appointed Surgeon Lieutenant (for Short Service) (on probation), dated 12th December, 1958.

AUSTRALIAN MILITARY FORCES.

Honorary Physician to His Excellency the Governor-General of Australia.

Southern Command.—Colonel A. J. M. Sinclair, Royal Australian Army Medical Corps, is appointed Honorary Physician to His Excellency the Governor-General of Australia, 3rd February, 1959.

Central Command.—Colonel R. G. C. de Crespigny, E.D., Royal Australian Army Medical Corps, relinquishes the appointment of Honorary Physician to his Excellency the Governor-General of Australia, 2nd February, 1959.

Honorary Surgeon to his Excellency the Governor-General of Australia.

Western Command.—Colonel R. R. Anderson, M.C., E.D., Royal Australian Army Medical Corps, is appointed Honorary Surgeon to His Excellency the Governor-General of Australia, 3rd February, 1959.

Tasmania Command.—Colonel P. Braithwaite, E.D., Royal Australian Army Medical Corps, relinquishes the appointment of Honorary Surgeon to His Excellency the Governor-General of Australia, 2nd February, 1959.—(Ex. Min. No. 27—Approved 28th February, 1959.)

Australian Regular Army.

Royal Australian Army Medical Corps (Medical).

The age for retirement of 2/40188 Captain F. N. Dwyer is extended until 14th January, 1961.

The Short Service Commission granted to 1/8077 Captain C. R. Wilson is extended until 30th June, 1959.

1/8084 Captain G. Middleton is appointed from the Regular Army Special Reserve, Royal Australian Army Medical Corps (Medical), and to be Captain, 5th January, 1959, with a Short Service Commission for a period of four years.

Regular Army Special Reserve.

Royal Australian Army Medical Corps (Medical).

QX700202 Captain G. Middleton is appointed to the Australian Regular Army, Royal Australian Army Medical Corps (Medical), 5th January, 1959.

Citizen Military Forces.

Northern Command.

Royal Australian Army Medical Corps (Medical).—5/26552 Captain (Provisionally) R. F. Gorman is transferred from

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 21, 1959.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	2	1(1)	6(2)	..	1	..	..	..	10
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	3	..	..	..	..	..	2	..	5
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	1	..	..	1(1)	..	..	..	2
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	6(5)	11(9)	1(1)	..	1	..	..	..	19
Diphtheria	..	..	1	..	..	..	..	..	1
Dysentery (Bacillary)	..	2(2)	2(1)	7(7)	3(3)	..	12	..	26
Encephalitis	1	..	..	..	..	..	..	..	1
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	1	..	..	..	..	..	..	1
Infective Hepatitis	82(42)	24(12)	38(31)	39(12)	2(1)	..	..	1	186
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	4	..	4
Leptospirosis	1	..	3	..	..	..	..	..	4
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	..	1(1)	..	..	..	..	..	..	1
Ophthalmia	..	..	..	..	2	..	..	..	2
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	..	1	..	1(1)	..	..	..	2
Puerperal Fever	2(1)	..	..	..	..	..	..	..	2
Rubella	..	26(21)	..	2	4(2)	..	..	..	32
Salmonella Infection	..	..	..	..	1(1)	..	..	..	1
Scarlet Fever	9(4)	29(25)	3(3)	1	5(5)	1(1)	..	..	48
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	..	..	..
Trachoma	..	..	..	..	2	..	39	..	41
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	12(9)	10(9)	12(3)	1(1)	9(5)	..	..	..	44
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Royal Australian Army Medical Corps (Medical), Western Command, 1st January, 1959, with regimental seniority in accordance with Army Seniority (24th February, 1958). 1/39200 Captain N. C. Davis relinquishes the temporary rank of Major, 1st January, 1959, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command), 2nd January, 1959. *To be Captain (provisionally), 9th January, 1959*—1/39234 Peter Nicoll. *To be Lieutenant-Colonels*—Majors (Temporary Lieutenant-Colonels) 1/39189 V. E. Sampson, M.C., 1st January, 1958; 1/28390 I. H. Chenoweth, 20th May, 1958, and 1/10316 H. W. A. Forbes, 1st October, 1958. *To be Major 9th January, 1959*—1/61802 Captain (Temporary Major) J. Brienl. *To be Major, 9th January, 1959*—1/25222 Captain B. Bruce-Smith with pay and allowances of a Captain (at own request).

The provisional appointment of 1/46932 Captain N. C. Holmes is terminated, 16th November, 1958. *To be Captain (provisionally), 17th November, 1958*—1/46932 Noel Clarkson Holmes.

Eastern Command.

Royal Australian Army Medical Corps (Medical).—2/127879 Captain E. J. Hennessy is transferred to the Reserve of Officers (Royal Austarlian Army Medical Corps (Medical)) (Eastern Command), 1st December, 1958.

Royal Australian Army Medical Corps (Medical).—2/130120 Captain (provisionally) B. M. Allen relinquishes the provisional rank of Captain, 27th December, 1958, is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Eastern Command), in the honorary rank of Captain, 28th December, 1958.

Southern Command.

Royal Australian Army Medical Corps (Medical).—3/50287 Captain G. G. C. McKenzie is appointed from the Reserve of Officers and to be Temporary Major, 17th November, 1958.

Central Command.

Royal Australian Army Medical Corps (Medical).—F4/1237 Captain P. E. Rodriguez is appointed from the Reserve of Officers, 2nd December, 1958.

Western Command.

Royal Australian Army Medical Corps (Medical).—5/26544 Captain (provisionally) T. S. Samaha is seconded whilst in the United Kingdom, 21st April, 1958. 5/26527 Captain (provisionally) D. G. Kermode is seconded whilst undergoing post-graduate studies in the United Kingdom, 18th December, 1958. 5/26552 Captain (provisionally) R. F. Gorman is transferred to Royal Australian Army Medical Corps (Medical), Northern Command, 1st January, 1959. The provisional appointment of 5/26527 Captain D. G. Kermode is terminated, 17th December, 1958. *To be Captain (provisionally), 18th December, 1958*—5/26527 Denis Graham Kermode.

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps (Medical).

Southern Command.—To be Honorary Captain, 4th October, 1958—Ian Gregory McDonald.

Eastern Command.—To be Honorary Captain, 16th December, 1958—Charles Major Dimond.

Tasmania Command.—To be Honorary Captain, 7th January, 1959—Donald Cleveland Hodge.

The following officers are placed upon the Retired List (Western Command), with permission to retain their rank and wear the prescribed uniform, 19th January, 1959: Major K. D. Gray and Captain H. L. Cook.

The following officers are placed upon the Retired List (Southern Command), with permission to retain their rank and wear the prescribed uniform, 28th February, 1959: Lieutenant-Colonel D. Zacharin, E.D., and Captain R. W. Dungan.

The following officers are retired:

Northern Command.—Honorary Captain J. K. Joyce, 24th December, 1958.

Western Command.—Captain H. D. Phipps, 19th January, 1959.

Southern Command.—Honorary Captains R. W. Bradbury and S. F. Sutherland, 28th February, 1959.

Deaths.

The following deaths have been announced:

Reye.—Albert James Reye, on April 5, 1959, at Gin Gin, Queensland.

Merrillees.—Crichton Raoul Merrillees, on April 7, 1959, at Melbourne, Victoria.

Diary for the Month.

April 28.—New South Wales Branch, B.M.A.: Hospitals Committee.
April 30.—New South Wales Branch, B.M.A.: Branch Meeting.
April 30.—South Australian Branch, B.M.A.: Listerian Oration.
May 1.—Queensland Branch, B.M.A.: General Meeting.
May 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
May 6.—Western Australian Branch, B.M.A.: Branch Council.
May 6.—Victorian Branch, B.M.A.; Clinical Meeting at the Commonwealth Serum Laboratories.

Medical Appointments: Important Notice.

Medical practitioners are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales. Anti-Tuberculosis Association of New South Wales.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

All articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to The Medical Journal of Australia alone, unless the contrary is stated.

All communications should be addressed to the Editor, The Medical Journal of Australia, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, The Medical Journal of Australia, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this Journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

Subscription Rates.—Medical students and others not receiving The Medical Journal of Australia in virtue of membership of the Branches of the British Medical Association in Australia can become subscribers to the Journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 *per annum* within Australia and the British Commonwealth of Nations, and £6 10s. *per annum* within America and foreign countries, payable in advance.